SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXIII.--No. 17. [NEW SERIES.] NEW YORK, OCTOBER 22, 1870. $3 per Annum [IN ADVANCE.]

Improved Apparatus for Tanning Leather.

The engravings accompanying the present article illustrate a newly patented apparatus for tanning leather, in which the principle of constant circulation in the tan liquor is so applied as, it is claimed, to greatly facilitate the process of tanning.

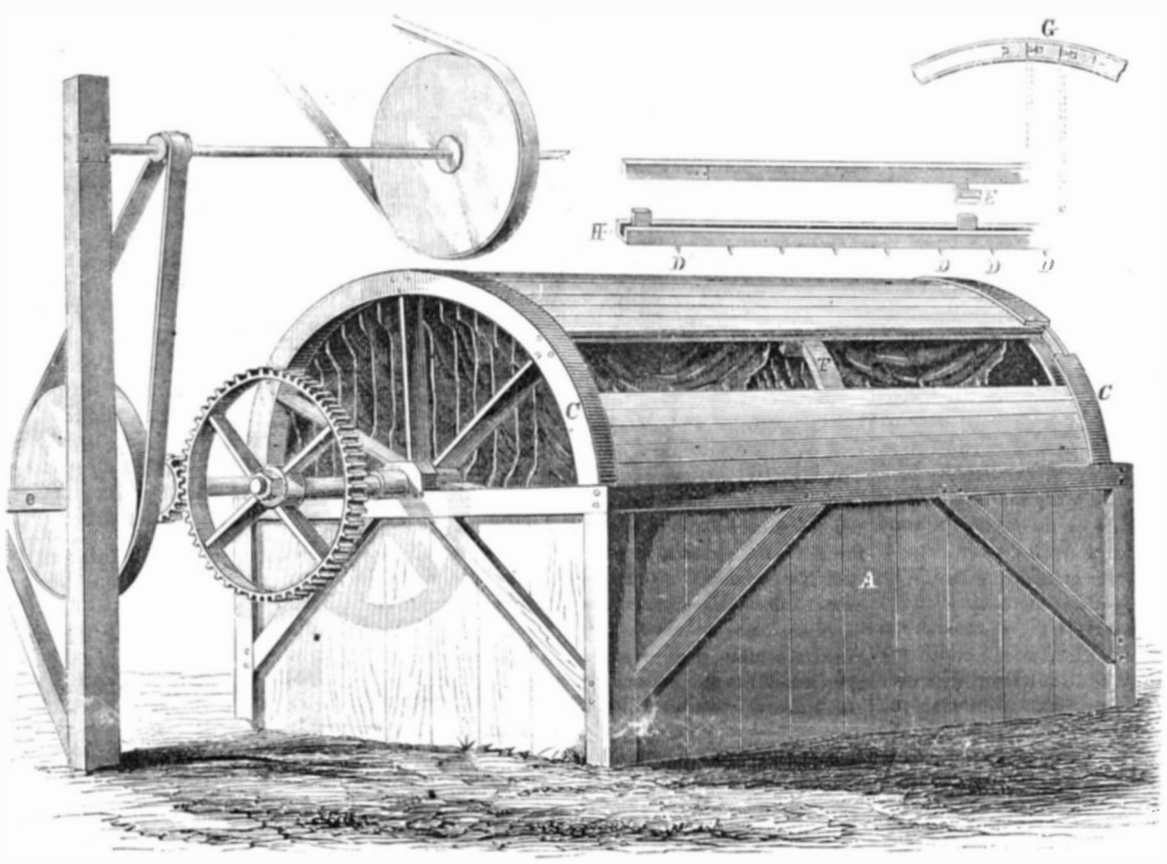
The inventors state that with a cylinder twelve feet long, and seven feet in diameter, 2,000 sheep skins can be tanned in the best possible manner in from four to six days with good liquor; that calf skins can be tanned in a superior manner in two weeks, and that by a slight enlargement of the apparatus in length and diameter, 200 cow hides may be conveniently tanned in three weeks.

The machine illustrated is calculated to equal in operative efficiency thirty pits of ordinary size, yet it is claimed it may be advantageously worked by one man, including the grinding of bark, preparing and changing the liquor, etc. A saving is made of the time and labor ordinarily expended in overhauling hides and changing liquor, which, in the old method, would require the labor of two men for from four to six months in tanning cow hides, and about six weeks for sheep skins.

We need not dwell upon the advantage to the manufacturer secured by the shortening of the process. The saving of interest on invested capital and in the wages account, will be evident without further remark.

The machine which we will now proceed to describe, is simple, and seemingly durable, and may be readily constructed by ordinary mechanics.

The tank, A, contains the tanning liquor. In it revolves the cylinder, in which the hides to be tanned are placed as hereinafter described.



ROBINSON'S IMPROVED TANNING APPARATUS.

The construction of the cylinder, is as follows: Two or three (more or less) heads are keyed to a center shaft, and on these heads are placed a succession of bars or lags, shown in detail at the top of the engraving. Each of the lags is provided with brads or spikes, D, and a central hook, E. This hook, when the lags are placed in position, engages with the central head, F, and the ends of each lag fit into rebates on the end heads, and are held there by bands, C.

The brads or spikes are inserted into one side of each lag, and when the lags are placed in position, the points of the spikes enter grooves in the juxtaposed lags, as shown in detail at G. The lags are kept at the proper distance from each other by blocks inserted in the grooves at the ends of each.

The hides to be tanned are hung on these brads, and are thus prevented from rolling up, and their whole surface is exposed to the action of the liquor at each revolution of the cylinder.

The liquor is kept constantly agitated; and its strength is evenly and uniformly distributed, thus insuring perfect saturation and uniformity in the quality of the leather.

Patented, through the Scientific American Patent Agency, August 9, 1870. For further information address John & S F. Robinson, Skowhegan, Me.

Hard on Evans.

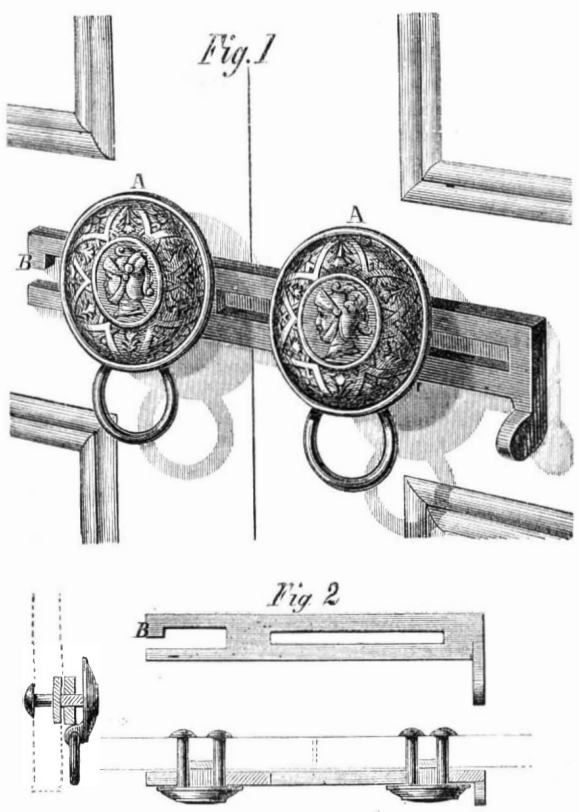
The Commissioner of Patents has published an order refusing to recognize Charles H. Evans, of Philadelphia, or any firm of which he is a member, as a patent agent, for gross misconduct. Evans puts in his answer the plea that his duties as editor and publisher of the *American Engineer* involved so much of his time that he was compelled to delegate his patent business *entirely* to his clerks, and that he was aware that in several instances they neglected to attend to their business. This is the second case of discipline applied to patent agents by Commissioner Fisher, who seems determined to put a stop to the frauds practiced upon innocent and unsuspecting inventors on the part of patent solicitors.

The Aurora Borealis.

There have been of late several brilliant displays of the Aurora Borealis, or Northern Lights, and the indications are that the present fall and coming winter will witness a succession of magnificent auroral demonstrations. These are accompanied with the usual magnetic disturbance and interruption of telegraphic working. The true character of the phenomena is still undetermined, but there would seem to be little room for doubt that they are electrical, and are mainly induced by the magnetic action or disturbances of the sun. The photosphere of the sun is in a state of great perturbation, and has been for some time past. At times the spots have been so extensive as to be almost visible to the naked eye. Cyclones and storms, of an extent and violence almost inconceivable to us, are taking place on the surface of our great luminary, and the auroras which render our nights brilliant and magnificent are, in some way, undiscovered, and perhaps undiscoverable by us, the result of these terrible manifestations.—*Telegrapher.*

IMPROVED DOOR AND SHUTTER BOLT.

The old style of bolt used on doors and outside shutters, which forms a staple article of large demand in the hardware trade, is familiar to all; it is made by riveting staples on a base plate, the plate being affixed to the door or shutter by screws, the bolt being carried by the staples and held from sliding too far back by a stop piece.



The objections to this style of bolt are so obvious and many, that it is strange they have not been long ago superseded by some better contrivance. They are clumsy and unsightly in appearance; are not capable of any change of form or usefulness; the rain or moisture gathers under the base plates; rust forms and soon disfigures, and even in time destroys the shutter; from rust and strain, also, the screws by which the plates are affixed to the shutter, and the riveted staples and stop pieces, become loose, or so weak as to be of little practical value for fastening purposes.

In the improved bolt here illustrated these objections are obviated. Fig. 1 is a perspective view; Fig. 2 contains details of construction.

The ornamental studs, A, being provided at the back with wrought-iron rods or nails at the time of casting the stud, the rods are driven through holes previously bored in the door or shutter, and may then be either riveted or clenched on the other side; before driving the right-hand side stud, the bolt is placed back of it, so that the clenching rods pass through the slot in the bolt; friction plates are also provided on the studs back of the bolt, to keep the bolt from rubbing the shutter; the friction plates may be made in separate pieces, or may be cast on the studs: the slot of the bolt, being temporarily widened to allow the friction plate or shoulder to pass through, is then closed to the proper width, and each stud is then ready, with the bolt permanently connected, to be driven through the shutter. This style of bolt can be made self-locking after the shutters are closed, and fastened by cutting the slot at the end of the bolt, a little wider, part way, leaving the stop piece, B; the bolt after being shot home drops down enough to leave the stud in the recess of the slot, and can be easily unlocked from the inside, by depressing the other end of the bolt in pushing it back.

The studs may be made of great variety of ornamental figure, and to correspond in pattern with the handsome door hardware now so fashionable; they can be cheaply silvered, bronzed, japaned, or galvanized, and by reduction to suitable size, will form a handsome ornamental fastening for inside shutters. In this improved bolt, the old fashioned separate ring and staple are done away with, and the studs may be provided with rings or not as desired.

The bolt is of wrought iron, and the stud may be cast or struck up in any suitable metal. The ornamental character of the whole strikes the eye at once, and its strength and usefulness will, we think, be conceded. With all these improvements, these bolts can be made, we are told, from twenty to forty per cent cheaper than the old style of bolt, according to this pattern. The whole right will be sold.

Patented, through the Scientific American Patent Agency, June 21, 1870, by Geo. B. Green, 1,754 Warnock street, Philadelphia, whom address.

ARTESIAN WELL IN NEBRASKA.—The labors of the parties who had been boring for the last eighteen months in Lincoln, the capital city of Nebraska, for salt water, were crowned with success. At the depth of 600 feet below the surface, in a stratum of sandstone, a lead of the great subterranean sea of salt water was recently struck, and the briny torrent came struggling up around the auger and shot into the air some eight or ten feet. It has since flowed strongly and steadily, and with great force and increasing strength forming a briny rivulet. It is believed by the experts who have seen the flow, that when the auger is withdrawn and tubing inserted, a stream of water will be projected from the well to the hight of fifty feet, making it the most magnificent artesian well of salt water in the world.—*Nonpareil.*

THE Commissioner of Mining Statistics gives the product of precious metals in the United States last year at $63,500,000, distributed thus: California, $20,000,000; Nevada, $14,000,000; Oregon and Washington Territory, $4,000,000; Idaho, $7,000,000; Montana, $12,000,000; Colorado and Wyoming, $4,000,090; New Mexico, $500,000; Arizona, $1,000,000; other sources, $1,000,000.

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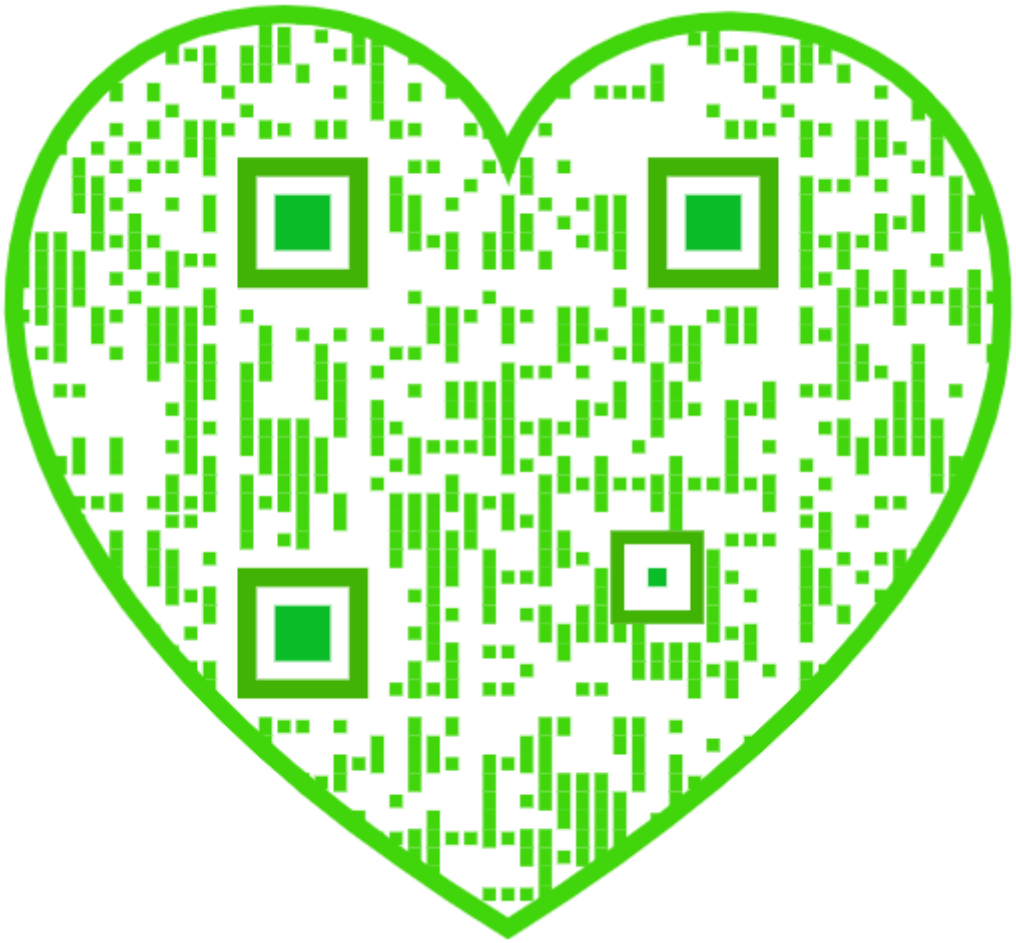

ELECTROLYTIC INSULATION.

We have to direct the attention of our telegraphic readers to a novelty in electrical science, and to a question which may, or may not, become of great practical importance in electro-telegraphy,—more especially in connection with underground lines. This novelty—for it is a new application of old facts—is what has been termed *Electrolytic Insulation*; and the question is whether this mode of insulating a current, or, rather, of insulating from each other two conductors forming the "sending" and "return" paths of a current, can be utilized for telegraphic circuits. We will first describe what electrolytic insulation is; and we will then state what we know of the results which have hitherto been obtained in its experimental application.

Supposing that we are called upon to insulate from each other two wires respectively attached to the terminal elements of a battery—say of four Daniell cells; the plan which first suggests itself is simply to place these wires apart *in air*, or in other words to utilize this common dielectric for the purpose of insulation. If, however, the wire be several hundred yards in length, we have to use another dielectric—stoneware or porcelain, glass or ebonite, etc.—at the points of support. Or, we may completely encase one of the wires in a dielectric of another class, such as gutta-percha or india-rubber; using the uncovered wire, instead of the earth, for the return current.

All these are examples of *dielectric* insulation. But the wires may be insulated from each other, under any given electromotive force, "by means of good conductors of electricity (metals and electrolytes) so arranged as to generate an electromotive force which opposes the escape of the current when the latter is transmitted in a particular direction." The insulator is then electrolytic. If, for instance, we respectively connect the wires above mentioned to the poles of another battery of four cells of Daniell, so that the electromotive forces of the two batteries may be opposed to each other, no current will pass; although a complete conductive circuit exists. Now this second battery—which is not required to transmit a current, but merely to exert statically a certain opposing tension or electromotive force—may be constructed in the form of an elongated cylinder, of any required length, composed of a tube, or series of concentric tubes, having as a central element the wire to be insulated. The tube, or tubes, and central element, being metallic, and being separated from contact with each other by means of a fibrous material containing an electrolyte, or moisture, constitute in fact a voltaic battery (if the opposing metallic surfaces be dissimilar), or a secondary battery (if the opposing surfaces be similar). The poles of this battery will be constituted respectively by its outer surface and the inner conductor; and the number of cells connected in series, and consequently the electromotive force of the arrangement, will be as the number of concentric tubes. It will be seen, therefore, that if the poles of a Daniell battery of equal electromotive force be respectively connected, through a galvanometor or other indicating instrument, with the poles of this elongated battery, at one of its extremities, no current will pass through the conductive circuit thus constituted *until the poles at the other extremity be brought into metallic contact*. When this occurs, there will be a complete *metallic* circuit, free from any opposing electromotive force, for the currrent from the Daniell battery; and this current, starting from one pole of the latter, will traverse the inner conductor of the cable battery and the wire uniting its poles at the distant extremity, returning by the external tube, or *vice versa*. Signals may thus be produced, at one extremity of the cable-battery, by uniting its poles at the other extremity.

Professor Miller, F. R. S., of King's College, thus describes an experimental or model cable on this principle, and some of the results obtained with it, which have not hitherto been published:

"The cable was made in a series of lengths of a yard each. I was informed that each of these lengths consisted of a conducting core of galvanized iron wire one yard two inches in length, coated with a fibrous material—this coated wire was inclosed in a soldered leaden tube one yard in length. The tube was then covered with thin zinc foil, and this in its turn was coated with fibrous material. The whole was then inclosed in a second leaden tube one yard long. Each layer of the fibrous material had been previously steeped in a strong solution of sulphate of magnesia, and allowed to become partially dry by exposure to the air.

"The composite tubes prepared as above described were laid side by side on an uninsulated wooden table covered with sheet lead (earth). The projecting ends of the galvanized iron core were connected alternately with the wire adjoining, by means of binding-screws and short pieces of copper wire, so as to make one continuous conducting cable; of 97 yards in length; the three other lengths needed to make up the 100 having been damaged.

"One extremity of this conducting wire was attached to a galvanometer and through this, by means of a commutating key, was permanently connected with the negative pole of a two-cell Daniell's battery, the positive pole of which was connected with the 'earth,' or with the outer surface of the cable through the leaden table.

"The other end of the cable was connected with a series of three resistance coils, consisting of 1,000 yards of fine silk-covered copper wire, 32 gage; and the other end of these resistance coils was insulated, but could be connected to earth at pleasure by means of a key.

"Every time that this connection of the earth with the galvanometer was made, the needle of the galvanometer was strongly deflected, and signals were transmitted through the resistance coils and cable.

"When thus arranged, the entire cable itself formed a battery of two cells, acting so as to produce a current in the *opposite direction* to that generated by the signaling battery, the electromotive force of which latter somewhat exceeded that of the current which the cable tended to produce, but which it did not actually furnish.

"That this really was the case was shown by reversing the direction of the current from the signaling battery, so as to cause it to *coincide* in direction with that from the cable. The galvanometer was immediately deflected with energy, and the needle thrown against the stop at 90° The insulation effected by the cable was thus shown to be due to the electrolyte, and not to any interposed dielectric."

It is not often that a fundamentally new system of constructing electric telegraph lines, "ingenious, and founded upon a principle the correctness of which cannot be doubted in the main"—as Prof. Miller states the present system to be—is brought to our notice. Whether or not this device of electrolytic insulation be susceptible of being adapted to the practical requirememts of telegraphy, it merits attention, and should be studied by advanced telegraphists. Our opinion is, that if certain mechanical difficulties in the construction of an electrolytically insulated cable can be satisfactorily overcome, this system might certainly become available for underground lines. The competent opinions which have been given as to the durability of such a cable are very favorable; metallic corrosion being obviated by the application of the principle upon which Sir H. Davy protected the sheathing of ships, whilst the decay of the fibrous material would not appear to impair its electrolytic property, nor to lead necessarily to any metallic contact between the elements of the cables.

We have recently witnessed an experiment—which may readily be repeated upon a small scale—with a modification of the apparatus above described, in which the "thin zinc foil" was dispensed with. The cable, at first possessed of no insulating power, becomes converted into a secondary battery by the passage of a strong current through it laterally from the inner conductor to the outer tube or *vice versa*. We may suggest the following miniature reproduction of this experiment to those of our readers who have time and taste for investigation. A galvanized iron wire 20 inches in length may be covered uniformly with hemp or cotton fiber, which is to be moistened with a solution of sulphate of magnesia (Epsom salts). This coated wire is then to be inserted into a leaden tube, 18 inches in length, the internal diameter of which should be just sufficient to allow of the insertion. If the negative pole of a Daniell's battery of 4 or 6 cells in series be now connected through a galvanometer (or "quantity" indicator) with one end of the inner wire, and the positive pole be connected with any portion of the tube, a strong current will traverse the arrangement. It will be noticed, however, that this current rapidly becomes weaker, and, when its intensity has fallen to a sufficient extent, it will be found that the arrangement, which has now become "polarized" or converted into a secondary couple, will insulate the current from one—or perhaps nearly insulate that from two—cells of the primary battery. Signals through the miniature cable may now be obtained by momentarily bringing the free end of the inner wire into contact with the tube. If this tube be in turn covered with fibrous material, as in the case of the inner wire, and inserted into a larger tube of lead; the cable, when subjected afresh to the process of polarization, will have acquired a double insulating power. By connecting up a battery, through a galvanometer, at each end of the cable, an electrolytical insulated telegraphic circuit will be represented; through which signals may be transmitted from either terminal by uniting the poles of the battery at that terminal, which is best done with the aid of a key to which the poles are connected.

It need scarcely be pointed out that the *inner* tube or tubes of an electrolytically insulated cable may be of very slight thickness, and that the same observation applies also to the fibrous coatings. Doubtless there are many difficulties to be overcome before this mode of insulation can become practically available in telegraphy; but it is quite possible that, in the future history of this science-art, electrotytic insulation may be made to render good service.—*Electric Telegraph and Railway Review.*

The Telegraph in Canada.

Mr. F. L. Pope, telegraph engineer of this city, has lately returned from an extensive tour of observation in Canada, and contributes to the *Telegrapher* an interesting report upon the extent and condition of the Dominion Telegraph system.

It appears that at the present time there are almost 2,000 miles of wires in operation, and 675 telegraph offices in Canada.

The engineering and construction of the Canadian telegraph lines display a great deal of British thoroughness, together with much of the conservatism that characterizes that nationality. They have apparently been very slow to adopt any of the innovations and improvements of later years, but their construction everywhere strikes the eye as being careful, substantial, and durable, while the lines are everywhere kept in such admirable repair that the general result is exceedingly satisfactory. The style of construction is nearly everywhere the same. Cedar poles are invariably employed, 25 to 30 feet long, and of much larger size than is common in the United States. They are placed ten rods apart, or 32 to the mile, and so firmly set that it is exceedly rare to find one out of the perpendicular. Glass insulators are invariably employed, one being placed on a locust pin inserted in the top of the pole, and the others, one above another, upon brackets nailed to the side of the pole, in the usual way. Cross-arms are used but in rare instances, even with a great number of wires. No. 9 English galvanized wire is universally employed. The lines of the Montreal Company are built by a gang of men, under an experienced foreman who has been employed by them for twenty years. They work during the entire season, being provided with tents and provisions, so that they encamp at night wherever they may happen to finish their day's work.

The Grove battery is employed on all main circuits, except for unimportant branch lines, where the bichromate battery is sometimes substituted. For locals an excellent form of Daniell's is in general use, in which the containing vessel is of copper, and constitutes the positive element of the battery. The favorite relays are those of Chubbuch, of Utica, and Williams, of Boston. Relays of the Williams pattern are now made in Montreal, and are being much used. The old standard Chubbuck register is found everywhere.

Taken altogether, the telegraphic system of the Dominion impressed me as being in a very prosperous condition. The Montreal Company pays an annual dividend of 10 per cent upon a capital of $750,000. The actual cash value of the property of the Company, however, exclusive of franchises, etc., can scarcely be under $1,000,000, if taken at any reasonable valuation. The competing lines have been so recently established that it is impossible as yet to form an accurate idea of their condition and prospects. It is probable, however, that the total amount of business done will be largely increased by the competition, as is the case in this country, and even in the event of the competing companies doing a profitable business, the revenues of the Montreal Company will not be seriously effected.

As by far the greatest portion of the Montreal Company's business is done upon a 25 cent tariff, it would hardly seem to leave a large margin for profits. It must be remembered, however, that the expense of line repairs (in this country a heavy item) is greatly lessened by the substantial construction of the lines, and interruptions are much less frequent than with us. The expense of operators—another large item—is less by 25 per cent, and the Canadians are also fortunate in an exceptionally favorable climate. It is probable that this latter fact, in connection with the excellent mechanical construction of the lines, is sufficient to account in a great measure for the satisfactory condition of the annual balance sheet.

The enterprise shown by the managers of the Montreal Company in supplying every portion of their territory, however remote, with telegraphic facilities, is worthy of warm commendation. The traveler who penetrates to the lumber regions of the upper Ottawa, the distant coasts of Gaspe, or the heart of the Adirondacks, now finds that the wires have preceded him, and it will probably not be many years before a cable line will be laid through lakes Huron and Superior, connecting with a land line to Red river and across the plains of Sackatchewan, and over the Rocky Mountains, to join the Western Union line in British Columbia.

Luxury in Ancient Rome.

If anything more were wanted to give us an idea of Roman magnificence, we would turn our eyes from public monuments, demoralizing games, and grand processions; we would forget the statutes in brass and marble, which outnumbered the living inhabitants, so numerous that one hundred thousand have been recovered and still embellish Italy, and would descend into the lower sphere of material life to those things which attest luxury and taste, to ornaments, dresses, sumptuous living, and rich furniture. The art of using metals and precious stones surpasses anything known at the present time.

In the decoration of houses, in social entertainments, in cookery, the Romans were remarkable. The mosaics, signet rings, cameos, bracelets, bronzes, chains, vases, mirrors, mattresses, cosmetics, perfumes, hair dyes, silk robes, potteries,—all attest great elegance and beauty. The tables of thuga-root and Italian bronze were as expensive as the side-boards of Spanish walnut, so much admired in the great exhibition at London. Wood and ivory were carved as exquisitely as in Japan and China. Mirrors were made of polished silver. Glasscutters could imitate the colors of precious stones so well that the Portland vase, from the tomb of Alexander Severus, was long considered as a genuine sardonyx; brass could be hardened so as to cut stone.

The palace of Nero glittered with gold and jewels. Perfumes and flowers were showered from ivory ceilings. The halls of Heliogabalus were hung with cloth and gold, enriched with jewelry. His beads were silver, and his table of gold. Tiberius gave a million of sesterces for a picture for his bedroom. A banquet dish of Disilus weighed five hundred pounds of silver. The cups of Dresus were of gold. Tunics were embroidered with the figures of various animals. Paulina wore jewels, when she paid visits, valued at $35,000. Drinking-cups were engraved with scenes from the poets. Libraries were adorned with busts and presses of rare wood. Sofas were inlaid with tortoise shell, and covered with gorgeous purple.

The Roman grandees rode in gilded chariots, bathed in marble baths, dined from golden plate, drank from crystal cups, slept on beds of down, reclined on luxurious couches, wore embroidered robes, and were adorned with precious stones; they ransacked the earth and the sea for rare dishes for their banquets, and ornamented their houses with carpets from Babylon, onyx cups from Bythnia, marble from Numidia, bronzes from Corinth, statues from Athens—whatever, in short, was precious or curious in most countries. The luxuries of the bath almost exceeded belief; and on the walls were magnificent frescoes and paintings, exhibiting an inexhaustible productiveness in landscape and mythological scenes.

DECLINE OF TURKISH MANUFACTURES.—The manufactures of Turkey are reported, to be on the decline. The steel manufactories for which Damascus was famous no longer exist. The muslin looms of Scutari and Tirnova, which numbered two thousand in 1812, are now reduced to less than two hundred spindles, and Broussa and Diabekir, once famous for their velvets, do not now produce one tenth they did forty years ago.

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[For the Scientific American.]

THE EXCURSION OF THE BOSTON BOARD OF TRADE OVER THE PACIFIC RAILROAD---THE PULLMAN PALACE CARS.

The excursion train of the Board of Trade, of Boston, was a success,and I desire to add my testimony to that of the party which went in the Pullman train, as to the excellence of the arrangements, which far surpassed anything I have found here or elsewhere. Considering the number of persons, the extent of the journey, the magnitude of the grades,the beauty of the scenery at several points, it may be truly said that the excursion was a great success, and stands unrivaled in the annals of railroad traveling. It must be acknowledged that Messrs. Pullman deserve much credit for their enterprise and ingenuity. At the same time, it would be a libel on their intelligence to say that improvements cannot be made in the Palace Cars. Having had much experience in them, and having given much thought to the subject, I trust I shall not be considered querulous if I suggest some alterations which I am sure will be considered improvements by the class of travelers who generally occupy the palace cars, and are willing to pay to be comfortable.

Taking for dimensions the actual measurement of a "drawingroom car," built by the C. B. and A. road, at Aurora, Ill., namely, from buffer to buffer, 64 feet, as the standard or maximum length, and deducting 7 feet for platforms,etc., in order to get the inside dimensions, we have 57 feet. Six lengths of couches, including the partitions and one state room, at 7 ft., 49 ft., leaving for wash stand and water closet, 8 ft. The "saloon car" measures 3 ft. 4 in. more. I presume this space to be occupied by the organ on one side and a linen closet and desk or secretary, on the other

The principal defect in these cars is the want of sufficient accommodation for ablutions, etc. There are only two washbasins for twenty-eight persons, supposing that only two occupy each section and the two state rooms. There are only two water closets, and, as these have no water, they should be called dry closets, or broom closets. The next defect is in the unnecessary width of the couches for one person. They are about 40 in., which, allowing for the sides of the car, and calling the outside width 9 ft. 11½ in., leaves about 3 ft. space between the lower couches. About half of this space is taken up by the curtains when the berths are made up for the night, so that,when everybody is stowed away, a clear space remains for the conductor or servants to pass along of about 18 in., enough for that purpose but not enough to enable one to dress in with any degree of convenience.

Now for the remedies. Discard one state room in the 64-ft. car and put in one or two wash basins and another water closet, to be allotted to ladies, and, in the 67-ft. car, leave out the organ and secretary, and give more washing room and more closet room. Put into every water closet a small tank and a portable basin, towels, etc., and enlarge the aperture in the seat, as well as the conductor from the seat downwards. These small alterations will add much to the sanitary comfort of valetudinarians, as well as all others. To the first they are absolutely essential

As to the couches, if I cannot have them in the center of the car, leaving a space for servants on each side, and assuming that a section is to lodge only two persons, I would have them only 30 in. wide, giving 20 in. more in the center,which would add much to the comfort by day, and to the convenience for dressing in the morning, and going to bed at night.

The present couches are very badly formed for comfort by day, the seat being very hard, rounded in form, and with no convenient back or arms to rest upon. These should be upholstered with reference to the comfort of the occupants by day. Space enough should be left under the couches to stow away small valises, bags, and bundles, which now occupy the the limited center space, or are put away in distant closets, to the inconvenience of passengers. Now, there is only room under the couches to lose boots, shoes, and umbrellas. In order to give the required room, the seat need not be raised, nor the cushion curtailed. All that is wanted, is to leave off the deep ornamental facing board. More conveniencies are wanted for hanging up small articles,and some better arrangement for locking the upper birth. The present handle is much in the way of the heads of those occupying the lower couches in dressing. The system of ventilation seems to be imperfect; the occupant of the lower couch can control his window, and let in air, rain, or cinders, at pleasure; but the occupant of the upper couch gets only a modicum of air, filtered through the lower atmosphere.

Other small defects, which create a good deal of delay and dissatisfaction, are the small cocks supplying the very small basins with water, homeopathic towels, and the total absence of means for cleaning one's mouth, excepting by using the one drinking glass in the water closet, or outside the door at the risk of one's life. I do not mean to be understood as recommending railroad companies, or Pullman companies, to supply both brushes and yard-square towels, and a tumbler for each person,with a reservoir to spit in; but I insist on the practicability and convenience of having larger cocks, two mugs or tumblers to each basin, towels at least two feet square, and a general outlet or reservoir for mouth cleaners. It is no answer to say that the traveling public don't use tooth brushes, or require large towels, and much washing, and that they can sit on a hole 8x6.

I am sure that those who make long journeys and are willing to pay to be comfortable, will fully appreciate the small things I enumerate as essential to health and comfort It is no answer to say, that there never were before such conveniences as we have lately experienced, and that if the public don't like the arrangements, they should remain at home. These and similar answers are made when travelers suggest alterations; and it is also answered, that to add more weight or more space,would be inconvenient and costly. So far from desiring to add more weight, or more space, in width or hight of cars, or more cost, I would curtail the couches and all their fittings 25 per cent in width, and leave out much of the ornamentation, so as to reduce weight and cost, as well as the expense of occupancy.

Having touched on some of the inconveniences which all admit in the arrangements for the outward man, I must say a word as to the commissariat cars and appendages. The one I measured was 59 ft. long. The amount of space, the weight and cost of the cooking room,where some stores are also kept, are far beyond the necessities or wants of the traveler, who looks most to comfort, health, and economy. The attempt usually made to furnish a bill of fare equal to Delmonico or Parker, is not only a failure in quality, but a grievance in cost, and it also involves great heat in the dining car. In my experience, the cooking room was invariably in the front end of the car, so that all the heat, and bad smells, and confusion of getting through a narrow passage, in contact with servants and cooks,became a positive evil. I can conceive of no reason for ventilating the cooks at the expense of the passengers, unless it be thought that the more uncomfortable they make the latter, the less will they consume.

In hot weather, on long journeys, people do not require a great variety of food. A few good and simple dishes are all one wants, with good hot coffee, bread and butter, ice and water. In our California journey, the tables in the dining car, about 3 ft. by 2, were expected to seat four persons, and there was room enough for simple, well-cooked food, but not enough for the long list of half-cooked vegetables, meats, pies, puddings, jellies, pickles, etc. The tea and coffee were poor, especially the tea, the bread very good, and the attendance unexceptionable. My remarks must be considered as applying mainly to the drawing-room cars. The saloon cars are perhaps more convenient for small parties, being more private, but they also suffer from want of washing conveniences.

The California Pullman train was too long for comfort or safety—about six hundred feet, and nearly double the weight of an ordinary passenger train containing the same number of passengers, hence considerable delays were inevitable, which, added to the delays from hot journals, consequent to a new train, made the journey longer by a day, each way, than will generally be necessary to go from the Atlantic to the Pacific.

R. B. F.

East India Architecture---The Famous Taj.

The famous Taj, the gem of India and the world, the Koh i-noor of architecture, is situated about three miles from Agra, on the west bank of the Jumna. On approaching it, one sees white marble minarets rising among the trees. We halt at the grand portal of the great garden, and the entrance hall, or gate, so arrests us that we feel inclined to ask, with a little feeling of disappointment, Is this the Taj? This being a splendid building of hard red stone—whether sandstone or granite, I cannot remember—inlaid with white and black marble, and various colored stones. Its arched halls are spacious. We were conducted to the upper story, and from a great open arch, behold the Taj! All sensible travelers here pause, when attempting to describe this building, and protest that the attempt is folly, and betrays only an unwarranted confidence in the power of words to give any idea of such a vision in stone. I do not cherish the hope of being able to convey any true impression of the magnificence and beauty of the Taj, but, nevertheless, I cannot be silent about it. From the arch in the gateway the eye follows a long, broad, marble canal, often full of crystal water, at the extreme end of which rises the platform on which the Taj is built. Each side of the white marble canal is bordered by tall, dark cypress trees, and on feast days about eighty fountains—twenty-two being in the center—fling their cooling spray along its whole length, while trees of every shade, and plants of sweetest odor, fill the rest of the garden.

The buildings which make up the rest of the Taj are all erected on a platform about twenty feet high, and occupying a space of about 350 feet square. These buildings consist of the tomb itself, which is an octagon, surmounted by an egg-shaped dome of about seventy feet in circumference, and of four minarets, about a hundred and fifty feet high, which shoot up like columns of light into the blue sky. One feature peculiar to itself is its perfect purity; for all portions of the Taj—the great platform, the sky-piercing minarets, the building proper—are of pure white marble. The only exception—but what an exception!—is the beautiful ornamented work, of an exquisite flower pattern which wreathes the doors and wanders toward the dome, one huge mosaic of inlaid stones of different colors. Imagine, if you can, such a building as this—

> "White as the snows of Apennine,
> Indurated by frost,"

raising amid the trees of an Eastern garden rich in color, fruit and flowers, and standing against a sky of ethereal blue, with nothing to break its repose save the gleaming wings of flocks of paroquets, adding to the glory of color; and all seen in perfect silence, with no painful associations to disturb the mind, or throw it out of harmony with the pleasing memories of a wife and mother buried here by a husband who loved her for twenty years of married life, and who lies beside her.

We walk up from the great portal along the central marble canal, ascend the platform by twenty steps, and crossing the marble pavements, enter the Taj with a feeling of awe and reverence. Our admiration is increased as we examine the details of the wondrous interior. The light admitted by the door does not dispel but only subdues the gloom within.

We stand before such a screen as we have never seen equaled. Divided into several compartments and panels, it sweeps around marble cenotaphs that lie within it, and represent the real tombs seen in the vault beneath. It is of purest marble, so pierced and carved as to look like a high fence of exquisite lace work, but is really far more refined and beautiful: for everywhere along those panels are wreaths of flowers composed of lampis, lazali, jasper, heliotrope, chalcedony, carnelian, etc.; so that to make one of the hundreds of these bouquets a hundred stones are required. The Florence mosaic work does not surpass it. And all this vision in stone was raised by a Mohammedan Emperor over his dream of love—the wife who died more than two hundred years ago, when Christian Kings and Emperors were sent into dark and "weeping vaults"—"the longest weepers for their funerals!" with no ornaments save spiders' webs. When a musical note is sounded beneath this dome how strange are the echoes from within it. They are unearthly like those of an Æolian harp.

But who, it may be asked by that trying order of readers, called the lovers of knowledge—was this Emperor, and who was his wife, so honored? The father of the builder of the Taj, Jehanghir was the first ruler in India who received an ambassador from England, Sir Thomas Roe, in the reign of James I. Jehanghir married a famous beauty, Niher-ul Nissa, the widow of Sher Afgan, who, four years previously had been assassinated by this same Jehanghir. Her name was changed first into Noor Mahal, "the light of the harem," and afterwards to Noor Jehan, "the light of the world." Jehanghir, it may be noticed, as a characteristic of the times, had *impaled* eight hundred of the race of Tamour, who were "in his way" to the throne.

Shah Jehan succeeded him, having murdered his own brother in order to do so. He married Arzumund Banoo, the niece of the "light of the harem," the daughter of her brother. She was a good wife, and brought to her husband several children, among whom was Aurungzebe, who was the last ruler of the united empire of the great Akbar, his grandfather. After burying his wife in the Taj, Shah Jehan became a miserable debauchee. He has, however, been very quiet and sober the two hundred years he has lain beside Arzumund Banoo, beneath the marble dome.

The cost of the Taj, I may add, was upward of three millions of pounds sterling. Thousands of workmen were engaged upon it for long years. So much for the price of a sentiment. Was it too much? And how shall we balance the account between sentiment and silver?—*Days in North India.*

Trade-Marks.

In the April number of the *Bulletin* for 1869, in an article entitled "Memoranda on the Law of Trade-marks," we called the attention of manufacturers to the importance of this subject both in its legal and industrial aspects. Since the publication of that article, the common law rights in regard to this species of property, which had previously existed, have been considerably enlarged and extended by statute, and incorporated into the Patent Law of 1870, forming a part of the new patent system.

By the provisions of the Act, any person or firm, domiciled in the United States, or any corporation created by the authority of the United States, or of any State or Territory thereof; or any person, firm, or corporation, resident or located in any foreign country which affords similar privileges to citizens of the United States, and who are entitled to the use of any "lawful trade-mark," or who intend to adopt and use any trade-mark for exclusive use within the United States, may obtain protection on complying with certain requirements.

Such trade-mark remains in force for thirty years, and can be renewed for thirty years more.

The official fee for recording is twenty-five dollars, and for an extension the same.

Any "lawful trade mark," already in lawful use, may be recorded; but no proposed trade-mark, which is not, or can not become a "lawful trade-mark," or which is merely *the name of a person, firm, or corporation only*, unaccompanied by a mark sufficient to distinguish it from the same name, when used by other persons, or which is identical with a trade-mark appropriate to the same class of merchandise, and belonging to a different owner, or already registered, or received for registration, or which so nearly resembles such last-mentioned trade-mark as to be likely to deceive the public.

The rules for the assignment and recording of trade-marks are the same as for patents.

Adequate remedies are also afforded for the wrongful use of registered trade-marks by other parties.

This new law is of great importance to all manufacturers, enabling them to protect their articles of manufacture, and to obtain an honest monopoly and security against fraudulent and unscrupulous competitors.

[We copy the above from the *Bulletin of the Wool Manufacturers*, published in Boston. The importance of the law protecting trade-marks is well stated, and many manufacturers are availing themselves of the benefits which it affords. As an illustration of the application of the law, we mention the fact that a well-known firm in this city has taken four patents on peculiar trade names applied to umbrellas made by them. The fact is significant. Special instructions are furnished at this office.—EDS.

THE numbering of the people in New York city is finished, and the population is set down at 930 856, while in 1860 it was reported at 813,669. Figures are commonly regarded as of unimpeachable veracity, but there seems to have been a peculiar manipulation of them in the census-taking of the Empire City at some former time.

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TRANSPIRATION IN PLANTS.

The idea that plants transpire like animals is due to Muschenbroeck, one of the professors who have contributed most to rendering the University of Leyden illustrious. To test his theory he covered with a plate of lead the whole circumference of the root of a whole poppy, so as to prevent the vapor of the earth from interfering with his experiment. The plant was then covered with a bell glass cemented to the lead. After that, each morning when the naturalist came to visit the imprisoned plant he observed that even during the dryest nights its leaves were covered with an innumerable number of those drops of water to which the name of dew is given, and the sides of the glass themselves were quite obscured with it. It is not, then, from the air that the dew of the meadow and the leaf comes, but, as the Dutch naturalist learned, from the transpiration of the plant; dew is only their perspiration condensed.

This fact being thoroughly established, it only remained to decide the amount which vegetable transpiration produces. Mariotte tried a very elementary experiment on this head. Having cut off a branch and covered the section with impermeable cement, he observed that the leaves while withering had lost two teaspoonfuls of water in two hours, at a time when the air was tolerably warm. The naturalist therefore concluded that in twelve hours the branch would lose a dozen teaspoonfuls.

But such an estimate was far from being exact. Guettard managed better; he conceived the idea of not separating the branch from the plant, but of inclosing it in a globe of glass, terminating outwardly in a neck which was inserted into a flask. When all was hermetically sealed, the moisture transpired, condensing itself little by little on the sides of the globe, fell drop by drop into the bottle situated beneath it, and could be collected without the slightest loss, so that Nature was left to herself.

Inclosed in this apparatus, a branch of a cornel tree, weighing only five drachms and a half, distilled each day an ounce and three drachms of water; that is to say, it transpired double its weight in twenty-four hours, results which were far from being expected. See engraving.

When, on a burning summer's day, exhausted and steaming with perspiration, we see in a by-nook of a parterre the

garden sunflower, we admire its heavy floral crown turned toward the luminary which it ceaselessly accompanies in its course, and its simple motionless leaves; but this apparent calm veils a most unexpected vital energy.

Who indeed would think that the perspiration exhaled by the leaves of the plant is more copious than that which moistens our foreheads? Yet science has proved this; after demonstrating the existence of vegetable transpiration, it has dared to estimate comparatively the product of it.

An old physician, of Padua, Sanctorius, whose originality has become celebrated, had the patience to pass a great part of his life in a pair of scales, weighing and re-weighing himself every minute of the day, in order to ascertain how much loss his body underwent by transpiration. (Experiments show that on an average a man loses a kilogramme [2 lbs., 3 ozs., 4½ drs. avoirdupois] of watery vapors by means of his skin in twenty-four hours).

Hales, without having the same perseverance, attempted to ascertain what weight of water a sun-flower lost daily by its leaves. For this purpose he put one of these plants into a pot, the upper surface of which, hermetically closed with a plate of lead, only presented one small neck through which it could be watered. By weighing this sun-flower daily his scales showed him that it lost, by the transpiration of its leaves alone, twenty ounces of water in the twenty-four hours.

The experimenter having subsequently calculated the difference in extent between the skin of a man and the leaves of a sun-flower, found that the former is to the latter as 26 to 10, and that consequently, with equal surfaces, the insensible transpiration of the sun-flower is seventeen times as great as our own.

Contagious and epidemic diseases are now believed by scientists to be caused by living organisms which float in the air in the form of fine dust. These organisms enter the human system through the breathing passages and lungs, germinate, and spread over the body with astonishing rapidity. Professor Tyndall, of London, recommends the use of filters of cotton wool, to be so applied to the nostrils as to cause the air to pass through the cotton, thus effectually arresting the infectious dust.

HICKMAN'S HAND CORN PLANTER.

Our engravings represent a hand corn planter, which, it is claimed, is equally adapted to use in sod land and old cultivated land, and in wet as in dry soil. It is also claimed that with it, walking at the rate of two miles per hour, a man can plant from ten to twelve acres per day of ten hours.

A machine that could plant on sod has long been a desideratum for Western farmers, and the inventor informs us he has already received a large number of orders for this planter from Western men.

The machine has recently received the highest premium at

the Douglas Co., N. C., Fair, the only one at which it has yet been exhibited.

In old ground it covers the seed itself, so that no further manipulation is necessary.

The machine consists of a handle, A, a magazine, B, to hold the seed, a sod knife, C, which in old ground is replaced by one of another form, D, and specially adapted to wet ground, so that clogging is obviated, and much time is saved which has been lost in the use of other planters which have hitherto been used. Another form of blade, J, is used on dry ground.

The machine further consists of a gate, E, attached to a pivoted frame, F, which frame acts through a pivoted arm, G, to partially rotate a wheel placed in the chamber, H.

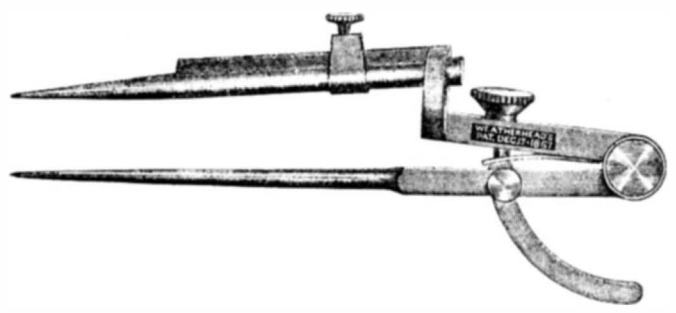
The wheel referred to is a cylinder of wood having a recess in one side, of the right capacity to contain the required number of grains. The grain falls upon this cylinder from the magazine, B, and, in turning, the cylinder or wheel passes under a flat brush of stiff bristles which prevents the passage of any more than the number of seeds desired.

In use the planter is taken in the hand as shown and pressed into the ground perpendicularly. Then the top of the handle is pressed backwards which causes the foot, I, of the pivoted frame, F, now resting upon the surface of the soil to withdraw the gate, E, from the aperture which it covers, and at the same time through the pivoted arm, G, to turn the wheel in the chamber, H, above described, so as to drop the seed. The planter is then raised perpendicularly out of the ground with a quick motion which covers the seed.

Patented, through the Scientific American Patent Agency, May 10, 1870, by Henry Hickman, of Omaha, Nebraska, whom address for State and county rights or for the planters themselves, which will be supplied singly or in quantity as desired.

WEATHERHEAD'S DIVIDERS.

The accompanying engraving illustrates a new form of dividers, having a movable point in one of the legs, adjusta-



ble so as to be lengthened or shortened for skiving as well as for ordinary drawing or marking circles. A larger circle may also be drawn than can be done by the same size of dividers made in the old style.

A common sized carpenter's pencil can also be used in place of the detachable point when desired, and the instrument can then be used in ordinary drafting. It is thought that this form of dividers will find favor with mechanics in all branches of the arts requiring the use of such an implement.

These dividers are manufactured by A. A. and G. L. Cooke & Co., Milford, Mass., and may also be obtained at the hardware houses of Patterson Bros., No. 27 Park Row, New York and of Nathusius Kugler & Morrison, No. 329, Bowery, New York.

Rights of Passengers on Railways.

The following is a recent decision in the Supreme Court of Maine, in the case of Goddard *vs.* the Grand Trunk Railway Company:

The plaintiff, a passenger in the cars of the company, surrendered his ticket to a brakeman who was authorized to receive it. Afterwards the brakeman denied receiving the ticket, called the plaintiff a liar, charged him with trying to avoid the payment of his fare, and with having done the same thing before; threatened to split his head open; shook his fist violently in the plaintiff's face, and only stopped the assault when the whistle sounded for the next station. It appeared also that the plaintiff was at the time in feeble health, having been for some time in the care of a physician; that he had neither said nor done anything to provoke the assault; that he had paid his fare, received and surrendered his ticket to the brakeman, who had delivered it to the conductor, in whose hands it was afterwards identified; that the defendants were notified of the misconduct of the brakeman, but instead of discharging him retained him in their service, where he was as the time of the trial. In view of the aggravated character of the assault, and the attendant circumstances, the jury rendered a verdict for the plaintiff of exemplary damages to the amount of $4,850. The defendants alleged exceptions; but the Supreme Court, in a very careful review of the case, fully sustains the verdict, both on the ground of its intrinsic justice and of public policy.

"The carrier's obligation," says the learned and thorough opinion of Judge Walton, "is to carry his passenger safely and properly, and to treat him respectfully, and if he intrusts the performance of this duty to his servants, the law holds him responsible for the manner in which they execute the trust. The law seems to be now well settled that the carrier is obliged to protect his passenger from violence and insult, from whatever source arising. He is not regarded as an insurer of his passenger's safety against every possible source of danger; but he is bound to use all such reasonable precautions as human judgment and foresight are capable of to make his passenger's journey safe and comfortable. He must not only protect his passenger against the violence and insults of strangers and co-passengers, but *a fortiori* against the violence and insults of his own servants. If this duty to the passenger is not performed, if this protection is not furnished, but, on the contrary, the passenger is assaulted and insulted, through the negligence or the willful misconduct of the carrier's servant, the carrier is necessarily responsible."

Fall-planted Trees and Vines.

Excessive wet, says the *Ohio Farmer*, is one of the very great evils to which the roots of newly planted trees are liable, the heavy rains of fall so completely saturating the earth around them that they are in danger of rotting during the winter. There is most danger, of course, where the land is flat, and has a compact subsoil. The most certain remedy is to drain as thoroughly as possible, and where not convenient at this time deep and wide furrows should be made, so as to allow the surface water to escape.

Loosening of the roots, by winds and freezing, is another danger to which fall-planted trees are especially liable on clay lands and in wet seasons. This danger is avoided by draining and proper care in planting. After the trees are set and the earth pressed firmly on to the roots, a little higher than the natural surface, a mound of additional earth should be piled around the stem eight to twelve inches or more in hight, according to hight and size of the tree, so as to prevent its being disturbed by the winds or heaved out by freezing. This mound of earth will also prevent the girdling of the trees by mice. Large trees should be supported by stakes, if exposed to high winds.

Mulching of newly planted trees, by placing a quantity of rotted manure or chip earth around them in the fall, is highly beneficial, especially for dwarf trees, and where the mound of earth is not required to hold them in position. This mulching protects the roots, in a measure, from frosts and enriches the ground. Where this is not done in the fall, it should invariably be done in the spring as a preventive of injury by drouth, as well as to enrich the soil and keep it mellow. Dwarf pear trees need this annual mulching with straw to keep them in a thrifty condition, and enable them to mature good crops of fruit.

Grape vines and raspberry bushes are liable to be injured by the winter when transplanted in the fall; hence, they should be protected by bending the stems down to the surface of the ground, and covering with earth. Straw or litter is not good, as it is liable to harbor mice or to generate mildew. The covering should be removed as soon as the buds begin to open in the spring. This kind of protection is recommended to be practiced every year for all the better kinds of raspberries, as they are found to bear surer and larger crops in consequence.

According to the *Engineer*, a Mr. Weeb has printed the Lord's Prayer from a copper-plate in a space not exceeding the one thousandth of an inch.

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Improved Padlock.

This lock is the invention of Mr. A. M. Adams, the inventor of the wood pavement, described and illustrated in another column. Its general working and details may be gathered from the accompanying engravings. Fig. 1 shows the lock when the hasp is locked, and Fig. 2 shows the same unlocked.

The hasp is locked by simply pressing it down to the position shown in Fig. 1. The hasp, on being so pressed, strikes the end of the bolt, B, forcing it back on a pivot, C, the slot in the center of the bolt, B, permitting the bolt to retreat against the action of a spring, and also to press against the end of the locking bolt, A, forcing the latter into the catch of the hasp as shown. The locking bolt is then caught and held by a tumbler actuated by a spring lying under the plate, D, and consequently not shown in the engraving.

When the lock is to be opened the key, E, is inserted as shown in Fig. 2, and turned into the position shown. The key has two wards, one of which turns under the plate, D, and releases the locking bolt, A, from the spring tumbler; the other ward presses against the part, F, of the bolt, A, and forces the latter back against the point, G, of the bolt, B, withdrawing A rom the catch of the hasp. The table end, H, of the bolt, B, which rests against the end of the hasp when the hasp is locked, is now rapidly forced up by the spring, throwing the hasp open, as shown in Fig. 2.

The lock is extremely simple, and the parts are very strong and easily made in quantity by machinery.

This padlock was patented, April 12, 1870, by A. M. Adams, whom address for further information, at 42 Fair street, Newark, N. J.

Fig. 1

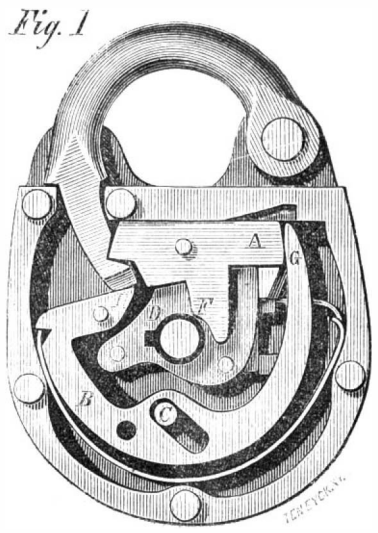
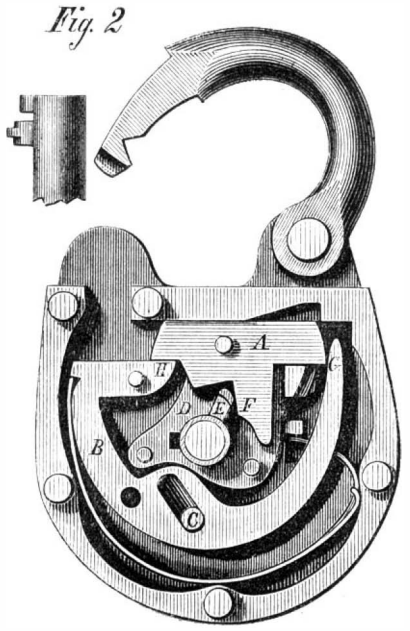


Fig. 2



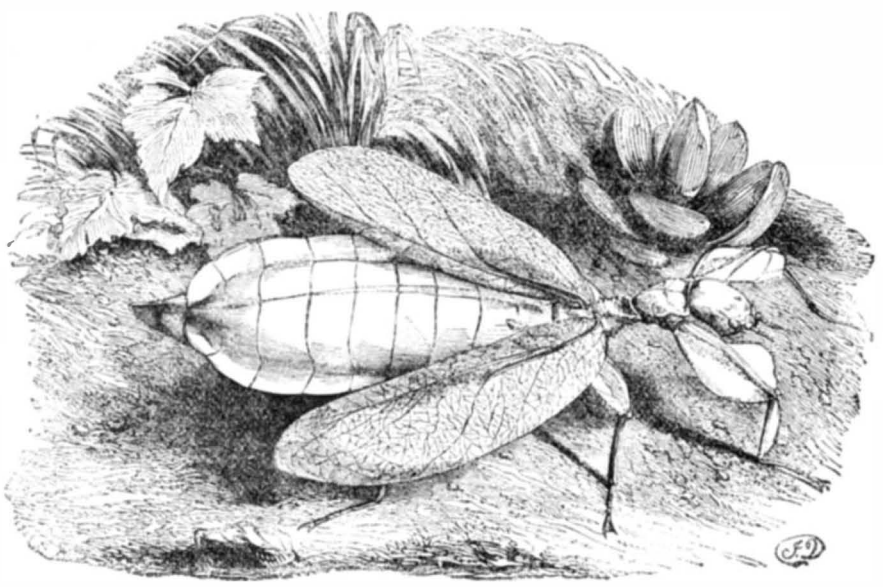
ADAMS' IMPROVED PADLOCK.

THE MANTIS.

The leaf-insects are found in very warm countries, but those from China and the East Indies are the best known. These insects are large, grotesque-looking things, uncommonly like a set of short, yellow twigs joined together by faded leaves. The limbs of the insects are long and slender, but flattened out in some places, and their bodies are either excessively slender and twig-like, or are flattened and large. The color of the insect, when it is alive, blends so perfectly with the tints of the surrounding leaves and boughs, that a careless observer would pass it by as a part of a plant. Hence the name of the leaf-insect. The female insect here represented has a large flat body with fine projecting edges, and when the wings, with their delicate lace-work markings, are folded over it, the whole looks like a crumpled and faded leaf. This appearance is increased by the flat, leaf-like expansions on the limbs, and by the curious markings on the fore part of the body, which joins the hind part just as some leaves are attached to twigs having round swellings on them. The males usually have a long and slender body, and the arms start from it just as small branches do from larger ones. They are remarkably quiet insects, and will remain perfectly still for a long time, and in very peculiar positions One of the favorite positions is to let the hinder part of the body rest flat on a branch, and to elevate the long body and arms in the attitude of prayer. One kind is called the praying mantis, from its constantly putting on this curious attitude. But really it is a natural hypocrite, and if it could speak it would say, "Let us prey," instead of "Let us pray." The posture of supplication is put on to take in the little flies which are so unreflecting as so believe that the blood-thirsty creature is a cool and inoffensive leaf. The flies alight close to the mantis, or even upon it, the clasped hands relax, and, in an instant, the unfortunate little insect is seized and crushed in the grip from which there is no escape. The resemblance of some of the kinds of mantis to the surrounding foliage is so great that it not only serves to entrap prey, but it also acts as a defense for and preservative of the insect; for birds on the look-out for flies and beetles pass the faded-looking mass of leaves and twigs as unworthy of their attention.

Some of the leaf-insects resemble green-leafed plants, and others those which are more or less autumnal in their tint. The female mantis lays its eggs upon plants, and covers them with a glutinous case, in which they are arranged in rows very elegantly. Some of the large kinds of mantis are from four to six inches in length. The males are very pugnacious, and can be made to fight most desperately by placing them opposite each other. They lift up their bodies, and use their long arms like sabers, and squeeze and bite until one is worsted. The leaf-insect is, perhaps, the best example of natural mimicry, and this gift of nature has, of course, nothing to do with the will of the creature.

The accompanying illustration will convey to the reader a general idea of this singular insect, though it is difficult without seeing an actual specimen, to appreciate its extraordinary esemblance to a vegetable production.



THE WALKING LEAF-INSECT.

Professor Chandler on the Purity of Croton Water.

The water supplied to the citizens of New York, at the liberal rate of sixty-five gallons to each person daily, is collected by the various branches of the Croton river from an area of 338 square miles in Westchester, Putnam, and Dutchess counties. The character of this water-shed is a sufficient guaranty of the purity of the water. The surface of silicious gravel rests on hard laurentian gneiss, and is open pasture or woodland, with few swamps. No factories line the streams, which are liable to contaminate the waters with refuse chemicals, and no towns or large villages exist anywhere in the district to pollute the waters with sewage. A recent survey of the water-shed has indicated fifteen points at which dams can be erected for the creation of large storage reservoirs, whose joint capacity would be 67,000,000 gallons, or a supply, at the present rate of consumption, for 1,000 days. One of these dams, 650 feet long, is now in process of construction at Boyd's Corner, in Putnam county, twenty-three miles from the mouth of the aqueduct. When this dam is completed it will flood an area of 303 acres, and the reservoir thus produced will contain 3,369,206,857 gallons, or a supply for fifty to fifty-five days of drouth.

Examinations were made of Croton water which had been in contact with lead for different lengths of time, under usually occurring circumstances, of which the following are the results:—1. A gallon of Croton water from a lead-lined cistern, in which it had stood for several weeks, was found to contain 0·06 of a grain of metallic lead.

2. A gallon of water which had remained six hours in the lead pipes of the chemist's residence yielded 0·11 of a grain of metallic lead, a considerable portion of which was visible to the eye, in the form of minute white spangles of the hydrated oxycarbonate ($PbO, HO + PbO, CO_2$).

3. Water drawn from one of the hydrants of the School of Mines' laboratory, in the middle of the day, when the water was in constant motion, yielded traces of lead. This water reaches the school through about 100 to 150 feet of lead pipe.

These results indicate the source of many hitherto unaccountable cases of lead poisoning, and are of a character to alarm the residents of New York, and to lead them to adopt precautionary measures for protection against this insidious cause of disease.

Many have already introduced as a substitute for lead pipe the "tin lined" or "lead-incased block-tin" pipe.

Prof. Chandler informs us that he has made a careful analysis of the water of lake Gilead, which has been recently turned into the Croton, and he found it to be singularly wholesome and pure. This is gratifying news to New Yorkers.

SHOEMAKERS' MEASURE.—No. 1 is 4⅛ inches in length, and every additional No., ⅓d of an inch.

Corrosion of Iron Gas and Water Mains.

In an editorial on this subject the *Gaslight Journal* remarks that the deposits which form in the interior of iron water-mains, cause serious annoyance and loss to many of our water companies. To so great a degree does this evil extend, that strenuous efforts are being made to substitute some other material for iron, which shall possess all its valuable qualities, and at the same time be free from liability to corrosion, and consequent obstruction. The appearance of this internal deposit is very singular and assumes various modifications. Sometimes the corrosion is of a uniform thickness, and appears to attack the surface of the iron evenly, while at others, the whole diameter of the pipe is jagged with tubercles of various sizes and shapes, occurring at irregular intervals.

Thus far no satisfactory explanation has been given of the causes of this peculiar deposit. That it is a species of oxidation is very clear, since the mass formed has all the external characteristics of iron rust; but why it should assume such peculiar physical properties, and present a configuration so unlike the outward forms of other oxidation, has not yet been satisfactorily explained.

The effect of this incrustation is obviously very disastrous to the economical distribution of water, as the diameter of the main is so much diminished as to reduce their capacity to that of much smaller caliber than they were originally constructed. In addition to this, the strength of the pipe is much impaired by this process of oxidation, and it is rendered much less able to bear sudden concussions and heavy pressure than previous to the formation of the deposit. This must be apparent to all intelligent observers, for it is at the expense of the iron that the incrustation arises. These facts are but too well known to engineers, who are fully cognizant of the difficulty under which they labor in endeavoring to remedy the evil.

The same evil obtains in regard to gas pipe, only in a less degree. The corrosion forms dust and scales, which drop off in time, and obstruct valves, traps, elbows, and connections. This is especially observable in inclined and vertical piping, such as lamp-posts, etc.

It has been a question with practical men, whether to substitute some other material for iron, or to adopt some means of internally coating iron mains, so as to preclude all possibility of the formation of accretions.

Methods have been tried to coat the interior of iron water-pipes with some substance which would protect the surface of the iron from contact with the water. This would seem to be the only remedy, but attempts in this direction have heretofore been attended with so much expense as to remove one of the strongest arguments in favor of the employment of iron, viz.: the economy of its application. Some few years ago, the Water Board in Brooklyn, coated the interior of their iron main with a mixture of coal tar and linseed oil, applied at a high temperature, but we have never heard whether that remedy has been effectual in checking the formation of accretions. It was said to impose an additional cost of $2·50 per tun on the mains.

Recently, Prof. Henry Wurtz, of New York, has invented a peculiar cement for making gas or water pipes, and especially adapted to coat the interior of gas mains, to make them perfectly impervious even to hydrogen gas, and to prevent corrosion.

Among the materials, other than iron, which have been commended and used to some extent for water pipes, are wood, iron-bound wood, and cement, and bituminized paper.

Plain wooden pipes have been immemorially employed in some places for distributing water, and are still used in many instances. Pipes made of wood and cement have also been adopted to a limited extent. They are durable, easily made, and have been made to withstand a pressure of 400 pounds to the square inch.

The pipes constructed of sheet iron, lined and coated externally with hydraulic cement, are said to be well adapted for distributing water where very cold weather does not prevail, frost being inimical to the integrity of the pipe. So also is high pressure said to be liable to injure the continuity of this kind of piping, especially at the numerous joints and connections.

In England, pipe made of bitumized paper has been employed in distributing both water and gas, but we have not heard that it has become popular to any great extent. It also was attempted to be introduced into this country, but without success, we believe.

Another description of pipe is constructed of wood, being bored from the solid log, lined with cement, and coated exterially with coal tar. This form of pipe is said to be extremely durable, and not being subjected to expansion and contraction by change of temperature, is entirely free from leakage.

In England and France, as well as in this country, the complaints on this score are wide and deep, and a wide field is open for enterprise in introducing an especial remedy.

A FALL of one tenth of an inch will produce a river current

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Correspondence.

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Boiler Incrustation.

MESSRS. EDITORS:—I have read with much pleasure your article on "Boiler Incrustation" in a late number of your valuable journal, and as incrustation is the source of nearly all the troubles steam boilers are heir to, I would, with your permission, say a few words on this subject. All impurities contained in water may be divided into two classes: first, such as are held in suspension, as sand, loam, or other mineral matters mechanically sustained in the waters of rivers or muddy streams; and, second, such mineral or vegetable matters as are held in solution, found in salt water and the water of most springs or wells. The first are precipitated when the water is left to stand for a length of time without agitation.

We find in all running streams that where the current is swift the water washing the sides and bottom carries with it loam and sand, which it again deposits in the eddies where the water is quiet. In a steam boiler the same thing can be done if proper regard is paid to the construction, so that a rapid circulation of the water takes place over all the surface exposed to the heat, producing a scouring, positive current, whilst at the same time receptacles are provided into which the impurities can be easily and surely deposited. Keeping in mind that the evaporation of a portion of the water increases the proportion of impurities contained in the remaining water, the receptacles must be so arranged that these impurities will fall into them.

To prevent the formation of scale all that is required is to so place these receptacles that the fire does not reach them. When water is heated its capacity to hold impurities is greatly diminished; therefore, wherever possible, large tanks or heaters should be used in which the water may be heated by the escape steam, in such a manner, however, as to leave the water as quiet as possible, and such tanks should be cleaned out from time to time.

All water holding matter in solution contains a large percentage of carbonic acid; in fact, its power of holding minerals in solution depends on the quantity of carbonic acid. When such water is used in a steam boiler it should be first heated, and the more it is agitated the better. This should be done in an open tank, from which it should flow into the heater, or be pumped through. The boiler should have receptacles reaching nearly to the water line, with large dish-shaped openings, so as to form quiet spaces at the water line, where the scum can concentrate, and be finally precipitated into the receptacles.

A positive circulation of the water over the heating surface, and a reservoir for the collection of impurities, not exposed to the action of the fire, is an absolute preventive of incrustation and the whole train of injuries caused by it, for no boiler can be considered safe in which solid incrustation can be formed on the surface exposed to the action of the fire. Circulation of water takes place in all steam boilers, but there is a wide difference between the mere change of water and a sweeping current passing over the heated plates from the part farthest from the fire until it leaves them where the heat is the greatest, continually absorbing heat and increasing in velocity as it increases in volume. And here, where the heat is greatest, should be the eddy; here should the steam quietly separate from the water, and here also, should be a reservoir for the deposit of the impurities which the remaining water is now unable to hold either in suspension or solution.

I hope that practical engineers, aware of the importance of this subject, will give us their experience through your columns.

JOSEPH A. MILLER.

Boston, Mass.

[A free interchange of views upon the subject of boiler incrustation is desirable, both in regard to the peculiarities of the composition of scale in different parts of the country, and also in regard to the success or failure of various means employed to prevent and remove incrustations. We hope correspondents will give their experience upon this subject.—EDS.

On the Heat of the Superior Planets.

MESSRS. EDITORS:—On account of the remoteness of most of the superior planets from the sun it has been supposed that they do not receive sufficient solar heat to promote vegetation and support animal life. Uranus and Neptune, in particular, are called the arctic planets from the presumption that the absence of warmth there must be complete, and that they exist in a state of frigidity almost beyond our power to conceive.

By taking the average solar heat of the earth as a standard or unit, it amounts to a mathematical deduction that the heat of Mars must be very greatly less than that of the earth, while that of Jupiter is so small a fraction as to be almost equal to a deprivation. The latter planet, for instance, revolves in an orbit more than five times (5·16) farther from the sun than the earth; and, according to a well-known law of optics, it receives from the sun a little more than one twenty-seventh $\frac{1}{26\cdot6}$ as much heat as the earth. To the inhabitants of Jupiter (if any such there be) the sun appears about one twenty-seventh the size it appears to us, the rays of light and heat diminishing in the ratio of the square of the distance.

It is evident, I think, that were the heat of the earth to be reduced to the mere fraction I have named, vegetation and the ordinary processes of growth and reproduction would cease. The tendency to radiation by night would be far in excess of the amount of heat received by day. The coldness would continue to increase until the lowest forms of organized life, which might survive for a time, would at length wholly cease to be propagated. We are then justified, apparently, in inferring that the planet Jupiter must be destitute not only of human inhabitants, but of all forms of animal life.

But, conceding it to be true that Jupiter, from its remoteness from the sun, receives, on equal areas, but one twenty-seventh of the heat supplied to the earth, still the relative value and effect of that heat may, and doubtless does, depend on the character of the atmosphere enveloping the planet.

Our observations show that the effect of the sun's rays is proportioned to the density of our atmosphere, inasmuch as their heat is greatest in the lowest valleys, while, in ascending high mountains, we encounter a gradually decreasing temperature, proportioned to the hight and rarity of the atmosphere, until a region of perpetual snow and ice is reached at no greater elevation than about three miles above the sea-level, even within the tropics.

It is quite possible to conceive of an atmosphere capable of permitting the entrance of the sun's rays towards the planet while preventing their withdrawal. Professor Tyndall proves that a layer of air two inches in thickness, saturated with the vapor of sulphuric ether, would offer very little resistance to the entrance of the solar rays, but would cut off fully thirty-five per cent of planetary radiation.

But before resorting to the necessity of supposing, for the superior planets, the existence of a chemically prepared atmosphere to increase their supply of solar heat, let us see if such necessity exists. Let us, on the contrary, simply suppose the atmosphere enveloping Jupiter to be substantially of the same constituents as our own, and at the same time of an increased bulk and quantity precisely proportioned to the excess in size of that planet over the earth.

By a comparison between the mass of Jupiter and the mass of the earth it has been satisfactorily demonstrated that a pound weight removed from the earth to the surface of Jupiter would there, by reason of the greater attractive force of that planet, weigh about two and one half pounds. And this greatly excessive force being at all times directly employed as well upon the atmosphere of Jupiter as upon all other substances or bodies within its influence, the density of that atmosphere at the planet's surface must be proportioned to the downward pressure of the superincumbent weight.

Assuming that the atmosphere of Jupiter, at the planet's surface, is two and one half times denser than our own, I are not prepared to say (although the calculation thereof would not be difficult) what would be its precise effect or degree of augmentation upon the sun's rays. But by analogy to the observed effects on the earth, to which I have alluded, I take it for granted that it would have the effect to render the heat of Jupiter quite adequate to all the wants of life, if not equal to that of our earth. And, carrying out this idea, and applying it to the cases of the other planets, I am far from believing that the want of a proper amount of solar heat forms an obstacle to the production and development of animal life in its highest forms on any of the planets of our system.

GEO. W. CHAPMAN.

Milwaukee, Wis.

Popular Errors Regarding the Watch---Breaking of Main Springs.

MESSRS. EDITORS:—A majority of people have an impression that over-winding breaks the main spring. That accident can never occur in such watches as are provided with "stop work," which allows only a definite number of turns to the spring; and it seldom occurs in those not so provided, because the main spring hook, against which the force comes when the spring is fully wound is usually stronger than the teeth of the main wheel, and consequently the strain comes, not on the spring, but on the other parts of the watch.

The cause of breakage is an unexplained mystery; no person yet has been able to give a reason satisfactory for it. A spring that has been in use one year is no more liable (as far as known) to break in ten years than in ten minutes. It is a tolerably well-established fact, however, that more springs come into the shop broken during certain known conditions of the atmosphere than when other conditions prevail. Whether the effect be produced by electric, hydrometric, or some unknown atmospheric quality has not been determined, probably will not be, until some extended and minute system of observations be instituted. The complaint used often to be made, when watches with fusee and chain were more in use than now, that the rascally watchmaker had stolen a piece off the chain while in his hands for repair. This opinion was entertained because sometimes the careless watchmaker had left the "stop work" so as to lack one turn of allowing the watch being completely wound up, which of course caused it to lack about six hours of running its full time. No watchmaker was ever so silly, no matter how dishonest he might be, as to steal a piece of chain; what would he do with it? it is utterly worthless to him, and worth even less than that to anybody else, and to steal it he must spend at least half an hour of time and labor, all for nothing; most of the modern watches have no chain, and consequently the accusation is now very rare.

More injury is done to watches by winding with an unsuitable key than is generally supposed. When not properly fitted it slips off, giving the whole train of wheelwork a severe jar from recoil; its effect on the watch is similar to that produced on the wearer, when he sits down on a seat which is about four inches lower than he expected. After a few such shocks, in winding it will be found to slip back occasional, and unless timely repairs are made it will some day go down with a crack, that will involve an expense of several dollars to repair as it should be. A key, all brass, properly fitted, is the best; a key with soft steel pipe is the next best, and a hard steel key worst of all. The soft key will not spoil your watch, for if either give way it will be the key, leaving the square of the watch perfect. Hardened keys will not yield to wear, consequently the watch must, and if the winding square be spoiled, no poor workman can replace it properly, and a good one only at considerable expense, experience will prove keys to be cheaper than winding squares.

Cleveland, Ohio. R. COWLES.

Fire Surface in Portable Engines--Improvements Demanded.

MESSRS. EDITORS:—I wish to say a few words to you in relation to the fire surface of portable engine boilers. I am in the habit of running them in the harvest field, giving power to thrashing machines. I took one into the field this season. It had run two previous seasons, one hundred and fifty days steaming, and I could not carry sufficient steam to give the proper amount of power. I thought that the boiler must be dirty, but there was no means provided for seeing the fire surface, so I could not know whether it was clean or scaly. I had just put in a fire of wood, and was looking at the steam gage, which indicated eighty pounds, the hand vibrating a good deal.

The engine was using up the steam as fast as the boiler was generating it, when, to my astonishment, the steam gage began to indicate higher steam, and in spite of all that I could do to check it, in four or five seconds it went from eighty to one hundred and forty pounds. Then there arose a cloud of dust from the smoke stack and the pressure fell rapidly, when I discovered that nearly all the tubes were leaking.

At the time this took place the glass gage and gage cocks showed three inches of water above the crown of the furnace. I let the water out of the boiler, and I took off a hand-hole plate behind the furnace. I found scale that had fallen from the tubes; it was three-sixteenths of an inch thick, and the parts that had been in contact with the tubes were covered with red oxide of iron. The tubes must have been red hot when the scale came off. There have been a number of portable boilers blown up here within the last few years, and the engineers have been killed every time. No person could account for the explosions. I think that I give you the key to some of them.

The remedy is so simple that I think it is time that it was made use of. The tubes should be in vertical rows, one tube above the other, with a space of an inch between each row, so that a cleaning tool could be used on every tube. More steam would be made with thirty clean tubes than with forty dirty ones. There should be a manhole plate on the shell of the boiler behind the furnace and over the tubes, so that if any person used a boiler rendered dangerous by scale and dirt he would be guilty, and the makers would be blameless. There are thousands of them needed here, but the expense of renewing the fire surface after every two hundred days' run prevents their general use.

JOHN MAILER.

San Francisco, Cal.

The Ailanthus Silkworm.

MESSRS. EDITORS:—I have read with much interest your articles, descriptions of insects, by Mr. Day, and noticed an inquiry made by a correspondent from Brooklyn as to the origin of the caterpillar lately noticed in the ailanthus trees in Brooklyn. I have reliable information that they are the Chinese silkworm, the seed of which was sent to the Patent Office, Washington, and distributed among the ailanthus trees in Brooklyn by an enthusiastic gentleman to whom they were intrusted for that purpose; the result of that singular present may be seen in the sad spectacle of trees stripped of their welcome verdure in exchange for dismal cocoons, which hang and dangle, entirely useless, and often at inaccessible points. I have killed many worms, and now kill all the large moths (they are night butterflies), as each female lays a large number of eggs, sometimes a second brood in one season. I do not spare a cocoon, and even those that I see on the sidewalks in the street, I crush. I have started a sort of crusade against this pest, and have interested others to aid in their destruction. I have seen none in New York, except on one ailanthus tree on the Fifth avenue. Perhaps those last ones came from the same source. * * *

Balancing Cylinders.

MESSRS. EDITORS:—I noticed in the SCIENTIFIC AMERICAN of the 3d inst. an article on balancing cylinders by W. O. Jacobi, of Mellenville, N. Y., in which he tells you how a cylinder can be cross-balanced, but he does not state how to take the cross-balance out. Now, in your remarks you say; "If cylinders can be so balanced, which we doubt, the mechanical world would like to know it." I have had an experience of upwards of twenty years, and in that time have had a number of such cases through my hands. When a cylinder is brought to my shop to be balanced, if it is cross-balanced I cause the owner of it to bring on his machine and also his horse power and horses, the same as if he was coming to thrash for me. We then hitch on the horses and get up the same speed on the cylinder as in thrashing; and I have seen a machine shake so much that no man would work near it. I took out the cylinder and laid it on horizontal steel bars and found it all right balanced on them. I then bored a hole in the end of a stave on one end of the cylinder, and put in about two pounds of lead. I then went to the other end of the cylinder, and bored a hole on the opposite side and put in about two pounds of lead, and the cylinder was again in balance.

I then lifted the cylinder into the machine and started up the horses to the full speed. I found it was no better. I took the cylinder out again and laid it on the horizontal steel bars,

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and took out the lead from both holes. I then bored holes into the ends of the staves exactly opposite to those already tried, and put the lead into them. I then tried the cylinder into the machine, and got up speed, with no better results. I took the cylinder out of the machine again, and drew out the lead, and then I bored a hole in the end of a stave, about ninety degrees up from those already bored, and put in the lead as before, and the same at the opposite end, and of course it balanced on the steel bars.

I then tried it into the machine, and when I got up the speed I found it greatly improved in the running of the cylinder. I then bored holes beside those last bored, and put in more lead into them equally at both ends, and on trial found it improving. I kept on adding until the machine began to shake again, which proved I had overdone it; so I took out some of the lead until I had it running perfectly steady.

That is my experience with one machine. I have had better success with others. I have sometimes succeeded at the second trial, and on one occasion I tried four times before I was successful.

Morrison, Ill. WILLIAM ANNAN

Balancing Saw-Mill Crank.

MESSRS. EDITORS:—The trouble of A. M. G., of Vt., as stated in your paper recently, seeems to lie between the standing balance and the running balance, as applied to crank motion. A weight equal to the weight of pitman, gate, and its attachments, placed in the crank wheel opposite to the wrist pin, and equidistant from the center; or a weight lighter in proportion as the distance from the center is greater than that of the wrist, will balance pitman, gate, etc., *only* while at rest. The balance weight in the wheel (when the mill is in motion) has a *centrifugal* motion only. The gate has a lineal motion only, while the pitman has a compound motion of both the centrifugal and lineal. When in motion, the weight of the wheel overbalances the parts that have the lineal motion, in proportion as the speed increases up to that point of speed in which the weight will travel the half circumference of its circle of motion, in the same length of time that a similar weight, starting from a point of rest, would fall by action of gravity, a distance equal to the diameter of this circle of motion.

At this point of speed the balance-weight in the wheel entirely ceases to be balanced by those parts that have only a lineal motion, and becomes of itself a great *overbalance*, causing the very difficulty it was intended to remedy. At this speed also or any higher than this speed, the weight in the wheel will only balance parts that have a positive centrifugal motion. How much of the weight of a pitman has a centrifugal motion, it may not be easy to determine. A considerable experience with crank motions, and a series of experiments with different weights of balance on the same crank, and under the same circumstances, seem to prove the above theory, and show that, at the speed at which an upright saw ought to run, a weight that will balance the crank arm and wrist pin, together with about one third of the weight of pitman, will run more smooth and steady—more nearly in balance, than with much lighter or heavier balance weights.

Painesville, Ohio. H. H. COE.

A Remedy for Ivy Poisoning.

MESSRS. EDITORS:—Having seen a short notice in your paper of the 13th of August, in reference to poison ivy, I will give you some of my experience with it.

A friend of mine and myself were hauling logs in the summer of '64, to build a dam with. There was a chopper in the woods cutting the logs, and we were loading and hauling. We used to get one load in the morning before the dew was off them, and in some way we got poisoned. We afterwards found that one of the trees had a large poison ivy vine on it, and the chopper had cut the large part of the vine off, and left the small clingers on the tree.

The young man that was with me was poisoned in his leg, where he had ridden on the log. His legs swelled up so he could not sit or stand. A doctor was called, who said that it would take at least three weeks to get him out of bed. My own hands and wrists were so bad I could not work. Some one proposed to me to get the leaves of the plant known to me as the poison nightshade (our correspondent doubtless means belladonna—EDS.), boil them in new milk to a poultice just stiff enough to stay on the parts, and bind it on, renewing it as often as the poultices should get dry. We both did this, and in less than four days my friend and myself were out riding.

I have seen it tried in numbers of cases since, and never saw it fail. This happened in the south central part of the State of Illinois.

St. Paul, Minn. C. E. DAVIS.

Wanted---Cheap Ice Machines for the South---Ice Five Cents per Pound in Natchez, Miss.

MESSRS. EDITORS:—I am a regular subscriber to your excellent paper, and feel that I could not do without it. After I am through with the duties of the day, I take it up, and reading it through, find mechanics, chemistry, agriculture, in fact everything that is necessary to relieve the mind of *my occupation*. Your letters and articles on chemistry, etc., have been most interesting, and reading them has prompted me to make an inquiry, and call upon the thousands of inventors of our country for an invention that will supply the greatest general need existing, and amply pay the inventor.

In this, and nearly all cities on the Mississippi river, the supply of ice is exhausted. Ice has been sold for three cents per pound; "from and after Sept. 15th, will be kept for the sick—parties must show physician's certificate;" and ice is *five cents per pound*.

This price is not exorbitant, because dealers will lose 50 Per cent in wastage, bringing ice from New Orleans. Now, I ask, is it not possible for *one* of our thousands of American inventors to perfect such a machine as can be sold to families, by the use of which they can dispense with ice, and cool their own cistern or well water? Certainly, if machinery can be perfected to make ice in New Orleans in August, machinery can be invented to cool water, at small expense.

Natchez, Miss. T.

Finale about the Fly-Catching Plant.

MESSRS. EDITORS:—Some thirty years ago my father had in his conservatory two plants which he then called the rarest plants and greatest wonders in the vegetable world (the *Mimosa pudica* being already an old friend), and those two were the *Dionœa muscipula* (fly-catcher) and the *Nepenthes destillatoria* (pitcher plant). Now-a-days they may be found in almost every hot-house.

The *Sarracenia purpurea*, common in our Northern swamps (and the *S. flava* in the South), is another wonder, and seems to combine in itself the fly-catching and water-collecting powers of both the above. But it is *not*, as your correspondent in the SCIENTIFIC AMERICAN, October 1, is inclined to believe, the plant referred to in *London Society*, as quoted in your issue of September 3. That plant is the *Arum muscivorum* (Linn), or *Dracunculus crinitus* (Schott), and is entirely different from any of the above. The insects collect in its spatulate calyx, while in the above the leaves are the irascible parts.

It is difficult to describe these four plants without woodcuts, by a few lines short enough for a journal not specially devoted to the matter.

As to the belief, that the "fly-catching" business is a part of the inner economy of the plant, we may, will all deference, rest assured that there is no ground for such a belief. Insects are caught and killed by the *Lychnis viscosa*, which is not sensible to their presence on the sticky stems. On the other hand, the *Mimosa* closes her leaves at the touch of a fly, without catching it. We find dead insects on many vicious plants, or parts of plants, even on the tender leaves of the little *Drosera*. Easy as it is for us to see clearly the natural office of insects in their relation to plants, as regards fructification, we cannot believe yet that plants catch and retain insects for their own living. CARL MEINERTH.

Newburyport, Mass.

"Buzzing Up" once more.

MESSRS. EDITORS:—I see in a late number of the SCIENTIFIC AMERICAN that a correspondent has tried the "buzzing up process," and has failed. As he quotes my language, I feel it my duty to reply.

I am writing for him and for science. I, too, have failed this year, and many other times, but many more times I have succeeded wonderfully, and I stake my name and character that it is not a hoax. It is a thing that refuses to be done, unless done just so.

I am not a spiritualist, but I have helped to move a small table by human electricity, but the séance at first was a long one, requiring patience. Why don't our friends the spiritualists get hold of this and make something of it? I am afraid it is going to take its place among the lost arts.

I am an old man, and in a peculiar position, or I should be trying it every day till I had conquered it. Besides, I am giving all my spare time to a mechanical improvement.

Princeton, Wis. WM. M. RICHARDS.

Curious Freak of a Thermometer---An Explanation.

MESSRS. EDITORS:—I have just received No. 14, SCIENTIFIC AMERICAN, in which "R. L. C.," of Connellsville, Pa., asks for information relative to the action of his thermometer. I have been using thermometers for measuring high temperatures several years, and have invariably found that after about a uniform length of time they became unreliable from the "checking," so to speak of the bulb. They will be all cracked up into little irregular squares, which for a while hold together, but finally a trifle of air or steam finds its way into the bulb, forced in by atmospheric pressure, when, Presto! the mercury flies to the top of the tube, and, of course, the same atmospheric pressure which forced it there holds it there until the top of the tube is broken off when it can be shaken out.

Let R. L. C. examine the bulb of his thermometer carefully with a glass, and he will see the cause of the difficulty, probably. WM. E. HYDE.

West Killingly, Conn.

How to Utilize Coal Dust.

MESSRS. EDITORS:—Having read a few remarks on the great quantity of coal dust lying useless at the collieries in pit, I thought I would make a few remarks upon its vast usefulness in manufacturing if properly manipulated into a soft coke for the use of smith work. If this be soft, bright, coal dust, as this kind of coke is most economical and desirable in smith work generally, it makes clean and very hot fires. A welding heat can be got with little trouble, and it leaves a clean fire with but very little slag or cinder after. There will be no doubling up of small articles in thrusting them into the fire. It should then be worth as much as the best coal.

Shelbourn Falls, Mass. J. P.

Brown's Pen Picture of the "Lord's Prayer."

Messrs. Trubshaw & Miller advertise in another column for agents to obtain subscribers for photographic copies of a very artistic piece of pictorial penmanship. The subject is the "Lord's Prayer," and the artist is Professor D. F. Brown, of Brooklyn, who expended six years of close labor in its execution. It is probably one of the most remarkable works of the kind ever executed with a pen. Few persons have either the skill or persistent patience to accomplish such a task. The heads of Christ and the twelve apostles, together with pictures of the crucifixion and other scenes in the life of Christ, comprising many full-length pictures, are arranged in a beautiful design, the portraits being accurate copies of celebrated pictures preserved in art galleries, and from the pencils of the great masters. The text of the "Lord's Prayer" is interspersed among the various groups and figures, the whole forming a unique and very attractive picture. It was executed entirely with the pen.

A Cheap and Efficient Low-water Detector.

MESSRS EDITORS.—Drill a one fourth inch hole at the low-water mark, either in the head of the boiler, in the crowning sheet of the fire-box, or the upper part of the flues. Tap out the hole to a full thread with a common taper tap. Make a plug of common tinman's solder the size and shape of the tap used; screw in the plug (it will cut its own thread); cut it off smooth with the outside surface of the boiler. If well put in it will never blow out under any pressure of steam. So long as covered with water the plug will not melt.

If the water gets below the plug so that the iron gets to a dangerous heat, the solder plug will melt out. A gentleman informed me that he had the plugs melted out of the crowning sheet of his fire-box three times, and each time found the water below the plug. SAFETY.

Remarkable Solar Phenomenon.

Prof. Langley, writing from the Observatory, Allegheny September 26, to the Pittsburgh *Commercial*, says:

The appearance of spots on the sun large enough to be visible to the naked eye, is a rare occurrence, but it may now be noticed by any one who takes the trouble to observe them. The aspect of the sun, through a large telescope, is one, just now, of singular interest, and it seems to claim special attention from the observers.

Here, where the remarkable changes of the solar surface have formed the subject of remarkable observation, daily maps of the position of the spots are made, and their singular variations have been the object of most interested scrutiny.

The side of the sun now turned toward us is, to-day, covered with hundreds of them, of all sizes, and in all stages of growth, while the opposite side, to be presented to us a few days later, is comparatively bare.

The area of one of the spots which is now near the center of the disk, has been computed from careful measurements and found to exceed 2,300,000 square miles. Such immense numbers convey no very definite impression, and perhaps a more vivid idea of the size may be gained by comparing it with that of the earth, whose entire area is less than a tenth part of that just given.

This is the area of the penumbra—an immense expanse of variegated forms, crossed by channels and convergent streams luminous matter, all shifting under some action like that some whirlwind which is twisting them from one position to another, and changing their forms from hour to hour. The current sometimes appears to rush downward, carrying with it great masses of the luminous matter to lower depths, and opening, as it does so, black cavities of a size commensurate with the scale on which this action is carried.

The largest of these cavities is seen to be overhung with parts of the brilliant surface, which visibly break away in enormous portions and sink in it, out of sight; indeed, it is quite within the truth to say that a globe the size of the world might be dropped in without touching either side. It is impossible to convey an adequate idea of the impression of infinite and exhaustless energy, of which one is conscious, while beholding this with adequate optical aid. Masses, the size of whole continents, are utterly changed in shape or disappear from one day to another, sometimes the observer watches them, and the whole "spot" is, to all appearance, being slowly rotated by the cyclones which are visibly working there.

This is one of many centers of similar action, not all on the same scale, but baffling the eye by their number and incessant change of form, which the draftsman labors after in vain, and which even the photographer can but imperfectly render. At one of our largest observatories, the photographer is employed to make a daily chart of these changes, and an inspection of its truthful and unbiased record will convey a more conclusive sense of the almost awful magnitude and energy of the solar forces, than the most vivid description.

One who has been accustomed to watch them must feel the inadequacy of any attempt to describe these "spots," and still more so of the fatality of trying to convey his own impression by any extravagance of description or comparison.

The wonder must lie in the consideration of authentic measurements, which are left to tell their own story.

The public may not share the interest of the professional observer in such matters, but our own planet is too intimately connected with these phenomena not to make them claim some interest from all of us. Why these magnetic needles move responsively to these great changes in the sun, or why auroras will light up our winter sky, at intervals more frequently repeated as this solar action is more violent, are questions which astronomy is now trying to answer. The fact that they do so is certain; the cause is still wholly unknown to science.

FAIR OF THE SOUTH CAROLINA INSTITUTE.—This fair will be held on the Washington Race Course, in the city of Charleston, S. C., commencing on the first Tuesday in November next, 1870, and continue through the week. The grounds are unsurpassed in extent, and embrace the race track so celebrated in past years. Extensive buildings are in progress of erection, and every facility will be afforded to accommodate all classes of exhibitors.

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Improved Wood Pavement.

Although for heavy traffic in large cities the public are demanding a pavement that shall combine the luxurious ease and beautiful surface of wood pavements with greater durability than has hitherto been secured by the use of wood for this purpose, yet for light traffic in all localities, and especially in Western cities near to large supplies of timber, there is but little doubt that wood will long remain a favorite material for the construction of roads.

We herewith illustrate a novel method of constructing such roads, recently patented by A. M. Adams, wherein, by the peculiar formation of the blocks, the concrete is formed into fluked wedges, which wedges cement and lock the blocks together, and thereby form an almost solid keyed arch, possessing, it is claimed, greater strength and durability than other wood pavements which have preceded it.

The manner in which the angular recesses in the blocks are boxed up prevents the concrete from spreading, and it will be noticed that by the peculiar arrangement of the blocks, each one of them is wedged and bound by four different wedges of concrete, and each wedging wall of concrete by four different blocks of wood, so that the more weight or pressure there is applied to the upper surface of the pavement the more solid and compact it becomes, every shrinkage of the blocks being compensated for by downward movement of the concrete filling. The effect of travel on it is to constantly drive down the wedges of concrete, thereby rendering the pavement more compact and firm by use. The pavement thus formed is impervious to water and forms an excellent foothold for horses.

Fig. 1 represents a section of completed pavement; Fig. 2 is an enlarged detail showing the method of placing the blocks; Fig. 3 illustrates the method of sawing the blocks.

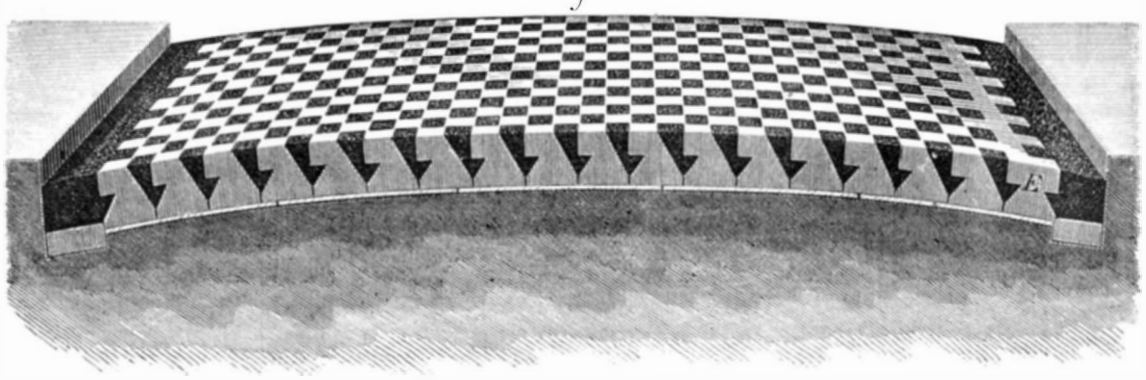
The blocks are first cut from the timber on a bevel shown by the line, A, Fig. 3. Portions are then cut off, so as to truncate one of the sharp edges of each prism thus formed, as shown at C. An acute-angled groove, D, is then cut in the back of each block. The timber used is 6 inches by 10½ in section, and the blocks are cut 6 inches in length. The blocks when thus cut are 6 inches square at the base, and 6 by 4 inches at the top.

The pavement is laid as shown in Fig. 2. Having leveled the bed of the road and laid a suitable foundation of concrete and well tarred flooring, the blocks are laid upon this flooring, placing them in rows, as shown, running with the line of the street, the vertical back of one block being made to face the diagonal front of the one behind it. There is thus formed between the back and front of every two blocks a pit the upper portion of which forms an acute angle, while the lower portion or base forms a right angle as shown at B. Every alternate row is laid so as to box up both ends of each and every one of the angular pits, as shown. The pits are then filled with concrete, well rammed, so as to fill up the pits solid to the surface. The whole pavement is then covered with a coating of pitch, coal tar, or any other suitable substance.

The lower end of the beveled face of each block is made vertical to brace the blocks together and prevent them from mounting each other, and also to prevent the concrete in the pit, B, from being forced down under the blocks.

For further information address the patentee, A. M. Adams, 42 Fair st., Newark, N. J.

Fig. 1



ADAMS' WOOD PAVEMENT.

Fig. 2

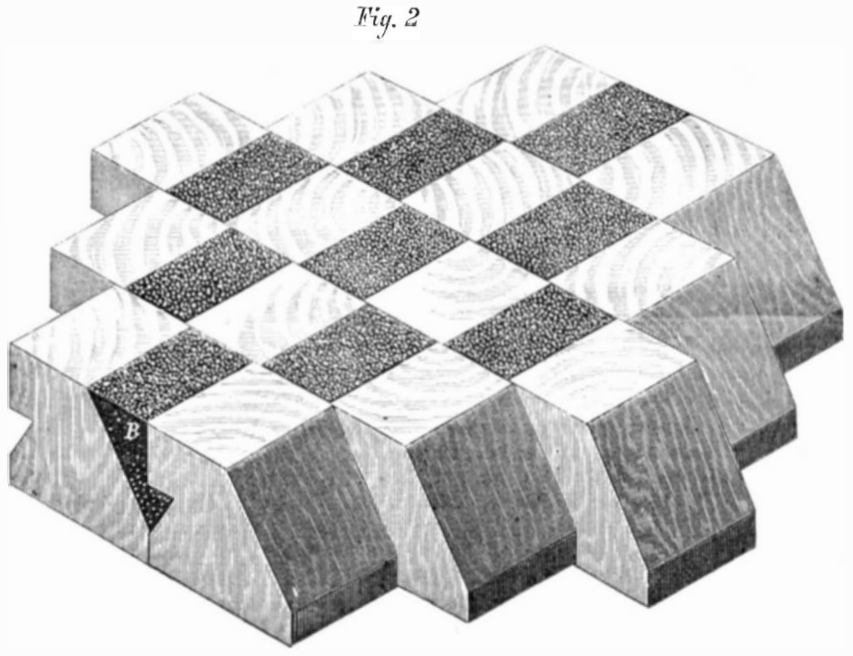
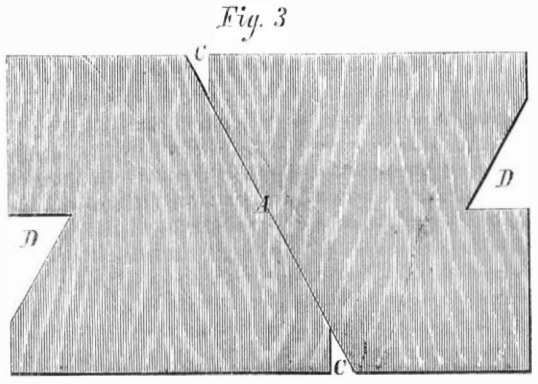


Fig. 3



Agriculture and Manufactures.

In an address recently delivered by Horace Greeley at the St. Louis Industrial Exhibition, the veteran journalist said:

"It were superfluous, I trust, to argue or demonstrate that Agriculture and Manufactures are natural allies, who ought to be near neighbors. However obscured by prejudice or partisanship, this truth is instinctively recognized by the general mind. Say to any purely agricultural community, 'We will establish works for the production of iron, steel, woolens, glass, porcelain (or almost anything else), among you, which will thenceforth employ a thousand hands, provided you will give us a square mile of eligible land for our buildings, and subscribe $100 000 to our stock,' and those requirements will be promptly satisfied—he who for fifty years has maintained that manufactures are a curse, cheerfully paying his proportion if he must, though he would rather let the whole sum be made up by others—out of regard for his consistency, of course. And even this delicate consideration will not prevent his doubling, because of that factory, the asking price of his farm.

"There is no region or district devoted to agriculture, which would not be benefited by the establishment therein of manufactures, and *vice versa*. Industry supplies the larger, and I think, better portion of the education of the masses; and it is vitally important to them that the portion of its processes which they are severally called to observe should be diverse and multiform as may be. If you tell me that a country might buy its metals and fabrics most advantageously by devoting all its industrial energies to the production of a single staple—say corn or cotton—to which its soil and climate are admirably adapted, I demur that all its industrial capacity *cannot* be devoted to the growth of that or any one staple, and that we need, not merely iron, copper, wares, and cloth, but the ability and skill required and developed by their production. Nay: We need that development and expansion of our else latent and dormant capacities which can only be secured through a diversified national industry. Had we been content to receive our fabrics from Europe, the most important and beneficent uses of india-rubber would probably have remained undiscovered to this hour: had we to this day bought of the old world our clothes ready made, the sewing machine would not yet have been invented. I deem it a very moderate estimate that the old world is this day richer by at least a billion of dollars because of American inventions and discoveries which would not have been made had the fathers of this republic seen fit—as they were abundantly urged to do—to keep our workshops in Europe, and devote their labor exclusively to the cultivation of the soil."

The Suez Canal.

A writer in the Boston *Traveler* gives the following notes on the present condition of the Suez Canal:

The Wabash and Erie Canal, 460 miles in length, occupies a space of 400,672,400 cubic feet, or more than half as much as the Suez Canal. Take seven of the largest canals in the United States, and any two of them will represent an amount of labor as large as does the Suez Canal. The difficulty with the Suez Canal is found in the fact that it is not, and never will be done. Storms of sand and land slides combine to defeat the object for which this avenue was constructed, and nothing but a perpetual dredging will keep it in a passable condition, making the work of keeping it clear of sand bars a constant repetition of the original work. But all this does not prevent it being a great successs.

The system of lights, signals, pilotage and towage is now so complete that the navigation in the canal is as safe and convenient as the entrance into New York harbor, while the constant dredging and excavating is every day improving the channel.

How much of a financial success it may be I cannot tell, as the number of men constantly employed exceeds one thousand, and the number of dredging machines over one hundred, which is a separate bill of expense from the tug-boats, pilots, etc. But at $2 a tun as toll upon ships, and $2 upon each passenger, there must be taken—now that it is crowded—at least $80,000 a day, besides the receipts for towage, pilots, supplies, wharfage, etc. As far as Egypt is concerned, it has been already of sufficient advantage to cover all expenses. The fresh water canal, which was built along the line of the larger, to supply transportation and water for beast and man while at work, has already changed the face of the country for miles on either side of it. Before its construction the railroad to Suez was often blocked by sand, which, like the snow in New England, blew up in great drifts over the track, and sometimes stopped the passage of trains for weeks. But since the presence of fresh water has covered a strip of the desert with vegetation, the track of the railroad has been changed, and, running along this canal, is never troubled with sand drifts; and the amount of labor saved on the railroad would construct the canal in two years. Without an inhabitant ten years ago, this was a useless, dismal waste; but to-day, towns and villages, thrifty and enterprising, stand at short intervals.

THE CARPENTER SELF-HEATING FLUTING MACHINE.

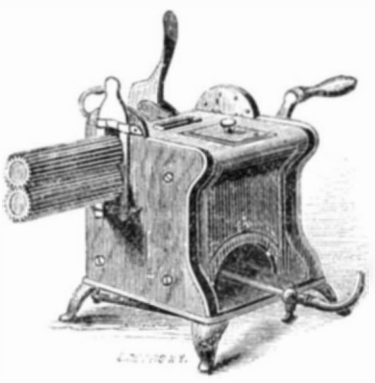
Among the many small labor-saving machines which have now become household necessities must be ranked the fluting machine. The one we herewith illustrate has advantages over others we have seen, which render it one of the most simple and convenient of its class.

It is designed to be heated by gas, or a spirit lamp, and the fluting rollers are kept constantly and uniformly heated to the required temperature. The machine is simple, substantially constructed, and totally obviates the necessity of change of the heaters from the fire to the rollers, which heaters need frequent renewal, involving expense and trouble. A saving in time is also effected, which, in addition to the other advantages named, must render this machine a popular and useful implement. It is now on exhibition at the Fair of the American Institute, in this city, and judging from the expressions of favor elicited from those who examine it, its merits are generally appreciated.

The fluting rollers are hollow cylinders fluted on their exterior surfaces, and are placed upon heating mandrels, about twice as long as the fluting rollers themselves. These mandrels have one portion inclosed in a heater—a small stove in which a gas jet or spirit lamp heats them, and the heat is conducted along to the portions upon which the fluting rollers are placed.

This application is so simple and obvious that it seems somewhat singular that it was not sooner thought of.

Only the upper mandrel revolves. The fluting roller on this mandrel is driven by a feather on the mandrel, and imparts motion to the lower fluting roller, which turns on its mandrel as a bearing.



A tension screw serves to adjust the pressure so that there is no danger of cutting the most delicate fabric.

A cam lever opens the fluted rollers, and holds them apart so that both hands may be used to introduce the fabric to be fluted. This is an improvement we have not seen on any other machine of the kind, and is a great convenience.

Wooden shields on both sides of the machine protect the hands from heat. These shields are secured to the sides of the heater, and perfectly remove all inconvenience from radiated heat.

Patented, June 28, 1870, by Miss Mary P. Carpenter, of San Francisco, Cal. The machines are manufactured by Henry Cromwell, 28 Barclay street, New York, to whom letters and orders may be addressed.

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Scientific American,

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ "The American News Company," 121 Nassau street, New York.
☞ "The New York News Company," 8 Spruce street, New York.

VOL. XXIII., No. 17 . . [NEW SERIES.] . . *Twenty-fifth Year.*

NEW YORK, SATURDAY, OCTOBER 22, 1870.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improved Apparatus for Tanning Leather....255
Hard on Evans....255
The Aurora Borealis....255
*Improved Door and Shutter Bolt....255
Artesian Well in Nebraska....255
Electrolytic Insulation....256
The Telegraph in Canada....256
Luxury in Ancient Rome....256
Decline of Turkish manufactures....256
The Excursion of the Boston Board of Trade over the Pacific Railroad — The Pullman Palace Cars....257
East India Architure—The Famous Taj....257
Census....257
Trade-Marks....257
*Transpiration in Plants....258
*Hickman's Hand Corn Planter....258
*Weatherhead's Dividers....258
Rights of Passengers on Railways....582
Fall-planted Trees and Vines....258
*Improved Padlock....259
*The Mantis....259
Prof. Chandler on the Purity of Croton water....259
Shoemaker's Measure....259
Corrosion of Iron Gas and Water Mains....259
Boiler Incrustation....260
On the Heat of the Superior Planets....260
Popular Errors Regarding the Watch—The Breaking of Main Springs....260
Fire surface in Portable Engines—Improvements demanded....260
The Allanthus Silkworm....260
Balancing Cylinders....260
Balancing Saw-mill Crank....261
A Remedy for Ivy Poisoning....261
Wanted—Cheap Ice Machines for the South....261
Finale about the Fly-Catching Plant....261
Buzzing up once more....261
Curious Freaks of a Thermometer —an Explanation....261
How to Utilize Coal Dust....261
Brown's Pen Picture of the Lord's Prayer....261
A Cheap and Efficient Low-water Detector....261
Remarkable Solar Phenomenon....261
Fair of the South Carolina Institute....261
*Improved Wood Pavement....261
Agriculture and Manufactures....261
The Suez Canal....262
*Carpenter self-heating Fluting Machine....262
Smoke Consumption....263
Effect of Artillery Discharges upon Weather....263
Artificial Stone—The Sorrel Process....263
Progress of the Manufacture of Colors....264
Scientific Intelligence....264
Applications for the Extension of Patents....265
New Books and Publications....265
Inventions Patented in England by Americans....265
The Fair of the American Institute....265
Answers to Correspondents....266
Recent American and Foreign Patents....266
List of Patents....267

To Advertisers.

The circulation of the SCIENTIFIC AMERICAN is from 25,000 to 30,000 copies per week larger than any other journal of the same class in the world. Indeed, there are but few papers whose weekly circulation equals that of the SCIENTIFIC AMERICAN, which establishes the fact now generally well known, that this journal is one of the very best advertising mediums of the country.

To Inventors.

For twenty-five years the proprietors of this journal have occupied the leading position of Solicitors of American and European Patents. Inventors who contemplate taking out patents should send for the new Pamphlet of Patent Law and Instructions, for 1870.

SMOKE CONSUMPTION.

The perfect consumption of smoke in furnaces is desirable on other accounts than those usually mentioned in the general discussion of the subject; namely, the prevention of waste of fuel and the contamination of the atmosphere. But were there no other object than those specified there would still be sufficient to stimulate invention to the production of some efficient remedy. Under steam boilers, furnaces have been and are constructed so as to consume smoke as perfectly as desired. An instance of this kind was noticed on page 137, Vol. XXI., of the SCIENTIFIC AMERICAN, and directions for setting boilers so as to secure perfect combustion were given on page 129, Vol. XVII.

But in smelting furnaces vast quantities of combustible material escapes from the stacks, and besides being wasted, renders the air in their vicinity a vast smoke cloud, covering everything with smut. The inconvenience of this is great. The loss where coal is so cheap as is the case in iron districts, is not so great as to cause much concern, were it not that the fuel thus escaping is in the very best condition known for perfect combustion, and would, if consumed, give an intense concentrated heat unattainable in smelting furnaces constructed in the ordinary way.

We have before shown that finely pulverized fuel is in a much better condition for perfect and rapid combustion than when it is coarse, and we need not say that the more rapid and perfect combustion is, the more concentrated and effective will be the heat. The minute subdivision of carbon is carried to the farthest point in imperfectly consumed smoke. Send a stream of oxygen or of heated air into the hot smoke, and the energy of the combustion is astonishing to one who has never tried the experiment.

It is only from a want of a proper supply of oxygen that it is smoke at all. Put oxygen enough into such furnaces, and the gases issuing from their smoke stacks will be as clear and transparent as air itself.

The problem of furnishing a proper supply of oxygen must not be considered without due reference to the proper point at which the supply should be made to reach the heated gases. The combustible gases require, in order to unite with oxygen, a sufficiently elevated temperature, and for rapid and complete consumption they also require that the oxygen should be intimately mixed with them in the proper proportions.

The inventor of smoke consuming devices is obliged to content himself with a more or less gradual admixture, since he could not, even were it desirable, burn the gases instantaneously without explosions. These gases or vapors are, moreover, always mingled with incombustible gases, so that they have to be treated in a diluted state, which retards combustion so much that it would be difficult to reach the point of explosive rapidity where there is a free draft, although such explosions are common enough in domestic stoves and furnaces.

Further difficulties arise from the employment of mixed fuels, especially if there is a want of uniformity in the admixture, as where pea coal and coal dust are mixed with the shavings and sawdust of wood-working establishments.

From these considerations we are led to the following conclusions, that to successfully consume smoke from fuels of different qualities, and from mixed fuels, there should be auxiliary admissions of air beyond the first entrance. In other words, the entrance of the air should take place not only all along the stratum of solid burning combustibles, but beyond it, and yet within the limit where the heat becomes so far diminished as to render combustion impossible.

Second, there should be means of adjusting and controlling this admission so as to vary it for various qualities of fuel, in order to get at all times and under all circumstances the best results.

There have been some methods of smoke consuming employed which nearly fulfill the conditions required, so far as perfect consumption of the smoke is concerned; but we think there is room for others cheaper and more manageable, which our inventors might supply, and for this reason we have been led to give the present brief summary of the difficulties to be surmounted, and the principles of smoke consumption.

EFFECT OF ARTILLERY DISCHARGES UPON WEATHER.

When two phenomena are observed to uniformly or nearly uniformly occur together, or when one uniformly or nearly always succeeds the other at the end of a short interval, the mind at once suspects some correlation between them. If it can be shown that following the continued discharges of artillery rain generally falls within such an interval as to not forbid the idea of correlation, this idea may fairly be entertained until it is shown that there is no fixed relation between the phenomena.

We feel bound to say that although we have long been skeptical in regard to the quite popular belief on this subject, we are gradually coming to the opinion that there may be something more than mere superstition in the supposition that cannonading brings rain.

It is now stated that since the opening of the present war in Europe that part of Germany in the vicinity of Frankfort has been almost constantly visited by rain and thunder storms, a most unprecedented thing at this season of the year. The German press has had its attention called to this fact, and in the light of other recorded facts has almost unanimously attributed these unusual storms to the firing of cannon and small arms in Alsace and Lorraine.

We find in an exchange the following facts bearing upon this interesting subject:

"The *Ungarische Lloyd*, in an interesting article, says that the history of the wars of the last eighty years are full of accounts of the great meteorological changes which have followed violent engagements in war.

"In 1861 Lewis called attention in Silliman's *American Journal* to the fact that violent rains and heavy cannonading appeared to stand in intimate connection. He said: 'In October, 1825, I observed a very plentiful rain immediately after the cannonading which took place in celebrating the connecting of Lake Erie with the Hudson. I published my observations on this event in the year 1841, expressing the opinion that the firing of heavy guns produces rain in the neighborhood. After the first battle in the last war between France, Sardinia, and Austria, there followed such important rains that even small rivers were impassable, and during the great battle of Solferino there broke out such a violent storm that the fighting was interrupted.'

"In July, 1861, McClellan's troops on the upper Potomac had four separate engagements on four days, and before the close of each violent rains fell. On the 21st of July Bull Run was fought in Virginia, and on the 22d rain fell the whole day till late at night. Under the heading, 'Can we produce rain when and where we like?' the Cincinnati *Woechterliche Volksblatt* for the 10th of July, 1862, remarked:

"'The cannonading (during the war) on the York River and James River, as well as the cannonading of Corinth and on the Mississippi, were fullowed by such fearful storms that the land was inundated.'

"The Bohemian campaign of 1866 was accompanied during the whole course by violent rains."

These facts point clearly to the correlation of artillery discharges with rain fall, yet they are hardly numerous enough, and other attendant circumstances are not sufficiently known to warrant the scientific acceptance of the theory as sound. The attention of scientific men is, however, so well directed to observation of the meteorological events succeeding heavy cannonading that the question will eventually be settled on valid authority.

If the notion that the explosive combustion of gunpowder can induce rain be definitely determined to be a true one, we shall at least have made one step towards controlling the weather by artificial means.

ARTIFICIAL STONE---THE SOREL PROCESS.

There is no field of invention which to-day is more replete with general scientific and practical interest than that pertaining to the manufacture of artificial stone. While, in the working of iron, men have sought out means whereby it can be rapidly and cheaply converted into the forms required, the world has to the present day been content with working stone after the same general method used in the construction of the pyramids. The rudest of all materials is thus changed by immense labor into costly forms; and the attempts to obviate the necessity for this labor and expense, have been confined to a very recent period

The idea that stone could be cheaply produced by artificial means, and molded to any form required, has gradually forced itself upon the minds of modern inventors, and has borne fruit in a large number of processes more or less practical and adapted to secure the end in view.

Very many of these processes have, however, failed to secure such results as to warrant their general adoption Some require the steeping of the stones in some solution after they are molded to remove or transform some contained material, or to add something which could not be advantageously added in earlier stages of the process. Among these is the celebrated Ransome process, which has not given uniformly satisfactory results.

Other sorts of artificial stones are sand concretes made with cements of various degrees of hydraulicity, and many of them of such inferior quality as to render them utterly unreliable for use as building material.

The process invented by M. Sorel, a celebrated French chemist, produces results which we have never seen equaled by any other. It has for its basis the use of oxychloride of magnesium, a new cement discovered by M. Sorel, who was also the discoverer of oxychloride of zinc. The process has been patented in this country, and the patent is owned by the Union Stone Co., of Boston, Mass., who apply it to the manufacture of all kinds of stone molded in ornamental forms for building purposes. They also apply it to the manufacture of emery wheels, needle sharpeners, oil and water stones, soapstone register rings, and faces for sad-irons, etc. In short, they work any kind of stone by this process, first disintegrating it by suitable mills and molding it again into any form wished, and by the use of the cement named consolidating the mass to even greater strength than it originally possessed, without alteration of color or apparent texture.

We have now before us specimens of marble, sand-stone, blue-stone, etc., which look exactly like the original stone, yet which are even more dense and hard than the stone from which they are made. The marble, which is a beautiful specimen, having a fine crystalline fracture was made of common marble-yard refuse. In fact, there is no sort of mineral solid material which the magnesium cement does not seem capable of uniting, and holding with great tenacity. The process of making stones by this method is as follows: Natural magnesite—carbonate of magnesia—is first calcined, which reduces it to the oxide of magnesium. In this state it is mixed dry in the proper proportion, by weight, with the powdered marble, quartz, sand, or whatever material forms the basis of the stone. It is then wetted with bittern water, which converts the oxide of magnesium into the oxychloride. The now semi-plastic mixture is rammed into molds, where it speedily hardens, sufficiently to be taken out and laid on skids. In two hours' time the stone is so hard that the heaviest rain will not wash the corners off, and in from a week to two weeks the stones may be marketed and used.

These stones are, according to good authority, capable of withstanding even more severe weather tests than natural stones. Tests made in Boston as to their strength are certified to have given better results than natural stone; and certainly the specimens we have, indicate that they are in no way inferior to the natural stones they severally represent.

The hydraulicity of magnesium salts has attracted the attention of several of the most eminent chemists in the world.

In a note recently read before the Academy of Sciences, in Paris, by M. Deville, he called attention to the action of water upon magnesia. A portion of a specimen of magnesia, prepared by calcining the chloride sent him several years previously by M. Denny, was kept constantly exposed to water under the taps of his laboratory. After a time it assumed a remarkable consistence, it could scratch marble, and, though subjected to atmospheric action for six years, it underwent no perceptible change.

The substance proved to be a crystallized hydrate. Subsequently, with magnesia prepared from the hydrate, he obtained similar results, and casts of medals after having been placed in water assumed the appearance of marble.

Magnesia obtained by calcination of the chloride prepared by treatment of sea-water, though its hydraulicity is partially destroyed by calcining at a white heat, exhibits remarkable hydraulic qualities when brought to a red heat. Equal parts of chalk or marble and magnesia formed into a plastic mass, becomes hydrated and extremely hard when acted upon by water. A paste made from dolomite, calcined below a red heat and powdered, forms, under water, a stone of extraordinary hardness.

The experiments of M. Deville show that to the hydraulicity magnesia is due the union of the particles of chalk or marble in forming a compact, homogeneous stone, and numerous obvious applications of this property of magnesia in the arts will readily suggest themselves.

M. Frémy, in his published researches on hydraulic cements, attributes the setting of hydraulic lime, first, to the hydration of the aluminate of lime, and, second, to the reaction of the hydrate of lime upon the silicate of lime, and the silicates of alumina and lime.

It is evident from these observations that the oxychloride of magnesium is a cement of great power and durability, and that as an hydraulic cement it ranks among the best known to modern science. Its application to artificial stone manufacture, we think, solves the problem of how to make such stones of proper density, durability, strength, and capability of taking a high polish. If we may credit the statements in regard to cost of manufacture, there seems no reason why stones of this kind should not be able to more than compete with cut stones of any variety and for any purpose.

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PROGRESS IN THE MANUFACTURE OF COLORS.

In no department of technology has there been more progress than in the manufacture of colors. The art of dyeing dates far back in antiquity,and it was one of the first in which chemistry began to take a part, while in the brilliancy of its results it surpasses all others. We are aware that certain itinerant lecturers are in the habit of adorning their sentences by allusions to the lost arts and reference to the Tyrian purple as something transcending anything we are able to produce at the present day. This is all very well for a lyceum audience, and helps the speaker to display his knowledge of the classics, but, in point of fact, the magnificent purple invented by Prof. Hofmann, and now made in quantities such as the ancients never could have dreamed of,is far beyond any trifling color that may have been lost to us.

We are not much of a believer in the value of lost arts, as compared with those we have found by the aid of the scientific knowledge of the present day. It is somewhat curious, that in Egypt, where the people were very fond of adorning their monuments with fresco paintings, the art of making the colors was kept as a secret by the priests. It was a priestly privilege to mix colors, just as it was the monopoly of noblemen to make glass in France in the middle ages.

The Tyrian dye was the same as that which is obtained from the coast of Mexico at the present day A sea mollusk yields the peculiar color. The little snail has a bag containing the purple color—this is pierced by a needle, and the thread drawn through it, until the material is exhausted, the snail is again thrown into the sea,.where the wound heals and the bag fills up with a new supply of the precious dye. Several thousand animals are required to color the thread for the manufacture of a few yards of cloth. The cloth becomes very expensive, but the inhabitants of Mexico will pay fifteen or twenty times as much for it as they will for articles dyed with the much more magnificent aniline colors.

The Romans were acquainted with a variety of colors, but the downfall of the Empire seriously deranged the business, and it finally disappeared altogether. The discovery of America was of great importance to this branch of industry. From the Western Continent was obtained various kinds of woods, and the Cochineal. To dye with the latter color required considerable skill, and the application of chemical knowledge. At first, alum was employed,which was afterwards exchanged for tin salt, by which a dye was obtained far surpassing the purple of the ancients.

One of the first books on the subject of dyeing was printed in Venice, in 1548, and attracted great attention. It was the occasion of the introduction of many new processes into Germany, France, Holland, etc.

In England great opposition was made against the introduction of indigo and Brazil wood by the manufacturers of other colors. Even the clergy were impressed into the service, and, during the reign of Elizabeth, matters were carried so far as to lead to the destruction of all the indigo there was on hand, and the absolute prohibition of the introduction of this article into the country, and it was not until the middle of the last Century, that all restrictions were removed, and the people were at liberty to make free use of this fine blue color. There was another instance of extraordinary legislation in the case of cotton printing in England. The manufacturers acquired so great skill, and the goods were so much admired and worn, that the Government felt it their duty, in the interest of the silk manufacturers, to prohibit the wearing of calicoes. For ten years this law was in force. Afterwards, by the payment of heavy taxes, cotton printing was allowed, and it was not until so recently as 1831 that the disabilities were removed, and cotton printing was left untrammeled.

Dyeing and printing have made enormous progress, partly through improvements in machinery and partly through the discovery of new colors. Originally the printing was done with small movable blocks, but,at the present time,the whole pattern is engraved upon copper cylinders, and one workman can print as much calico in a day,by the improved machinery, as 100 printers, aided by 100 journeymen, were able, in the same time, to accomplish under the old system. It is said that a piece of goods 6,000 feet long, something over a mile, can be printed with four colors within an hour. This is certainly a wonderful improvement upon the slow block process of olden times. The progress in the introduction of colors has kept pace with the invention of new machinery. In addition to the ancient organic colors, modern science has taught the use of mineral pigments, and we now have Scheele's green, prussian blue, manganese brown, chrome yellow, antimony yellow, chrome red, artificial ultramarine, and many others. The progress in the manufacture of colors carries with it a similar advance in cognate branches—for example, tannic and gallic acidsare now produced on a scale entirely unprecedented. Although the tanning of leather remains the chief use of the extract of oak bark, other applications have grown up, and tannic acid has become of great use in the manufacture of ink, of black dyes, and in medicine and photography. Chrome yellow led to a demand for bichromate of potash, and this, in turn, was applied to galvanic batteries, to the manufacture of the green sesqioxide for printing bank notes, to the preparation of chromic acid for use in the manufacture of various ethers, and of oxygen gas.

Nearly all of the organic colors have been made,artificially, by chemists, and there appears to be every reason to anticipate that indigo and alizarine will ultimately be made by some synthetical method, thus completing the list of artificial pigments. Our notice of the progress in this branch of industry would be very incomplete without some reference to the most important contribution to dyeing that has been made in centuries, and that is the invention and discovery of aniline colors. These colors are of such rare beauty that they leave nothing further to be desired. The great variety of shades, and the magnificence of the dyes so far excel anything the world has ever seen before, that it is difficult to conceive of further progress in this direction. From the crudest material we now extract the sweetest perfumes, and the brightest colors, and this is but one in a thousand of the contributions that chemistry has made to the arts during the past century.

PORTABLE DWELLING HOUSES.

Our readers will many of them distinctly remember when the "Gold Fever" first broke out in this country, and people eager to make their fortunes, were rushing into the wilds of California, that the need for cheap dwellings became so pressing, as to warrant the building of portable houses on the Atlantic seaboard, and the shipping of them all the way round the "Horn" to San Francisco.

It seems then, that the only question necessary to answer in order to decide upon the feasibility of reviving this industry is—"Will it pay?" We believe it will

In the suburbs of New York, there exists a very large demand for cheap frame houses, as well as for wood houses of some considerable pretension to architectural design and finish. The materials of which these houses are at present built, is brought from a great distance, and in its crude state, from localities where labor and power for driving machinery are cheap, to a place where power, labor, and shop room, are as dear or dearer than in any other place on the Atlantic side of the Rocky Mountains. All the waste is thus transported, and, though to some extent utilized as fuel, still adds to the cost of buildings.

Now according to well-demonstrated principles of industry, this order of things ought to be exactly reversed. The work should be done where power and labor are cheap, and the waste should not be transported thousands of miles, as is now the case.

It seems to us from these considerations, that the time is ripe for a revival of building portable houses. On the one hand is a vast market, on the other is cheaper labor, inexhaustable power at nominal cost, and material in abundance. Much of the work in a frame house may be rapidly and cheaply performed by machinery. The bulk of the planing, boring, mortising, turning, sawing, might be done in this way in large establishments, and houses so built might, in our opinion, be sent to this market at thirty three per cent less than their present cost, a very fair profit being allowed to the manufacturer.

A catalogue of designs from which orders could be made, could easily be prepared, comprising all the requisites to meet the various tastes and wants of purchasers; or purchasers might order from designs of their own or of resident architects, if preferred.

So far from appearing to contain any element of impracticability, these suggestions appear to us entirely practicable, and in accordance with the plain laws which govern other industries.

SCIENTIFIC INTELLIGENCE.

COMPARISON OF NATURAL AND ARTIFICIAL ICE.

The French company *Messageries impériales*, wishing to ascertain what kind of ice would be preferable for their vessels navigating the Suez Canal, caused experiments to be made under identical circumstances with several varieties, with the following results: Time required to melt 200 pounds of ice:

Natural ice of Switzerland	107 hours
" " Norway	115 "
" " Massachusetts	138 "
Artificial ice, Carre's machine	130 "
" " Tellier's machine	144 "

If these experiments were conducted with accuracy, they would seem to prove that artificial ice would have the preference over the natural production of our lakes and rivers for transportation on ship board, and for refrigerating mixtures. One series of experiments is scarcely sufficient to settle a question of this importance.

BEST POLISHING POWDER FOR GLASS AND METAL.

Lord Rosse had some difficulty in polishing the mirrors of his great telescope, and after trying various powders, finally adopted the red oxide of iron, jewelers' rouge, carefully prepared for the purpose.

The hydrated sesquioxide of iron is precipitated from a solution of pure sulphate of iron (green vitriol), and thoroughly washed. It is then well compressed to free it from moisture, and afterwards exposed to a somber red heat, as viewed in the dark.

The important precautions to be observed are to employ an excess of ammonia, pure sulphate of iron, and not to raise the heat above the point just indicated. The product ought to be a deep red with a shade of yellow.

Lord Rosse tried soda and potash, but was not able to obtain as good an article as with ammonia; the color was unsatisfactory and it did not polish as well.

NEW USES OF CHLORIDE OF ALUMINUM.

The anhydrous chloride of aluminum was found by Deville to be the most convenient compound for the manufacture of metallic aluminum. He prepared it by passing dry chlorine gas over alumina mixed with lampblack and oil, and collecting in a suitable receiver. It can also be made in this way on a large scale, but the expense is such as, together with the cost of sodium, to keep up the price of aluminum beyond the possibility of extensive use. The discovery of new antiseptic properties in the hydrated chloride of aluminum may lead to its more extensive manufacture, and consequent reduction in price.

Mr. John Gamgee, so favorably known for his recent preserving process, has found that the hydrated chloride of aluminum possesses excellent antiseptic properties. It is said to be quite as potent as chloride of zinc and carbolic acid, and is at the same time non-poisonous, and devoid of unpleasant smell. The fact that clay is one of the best disinfectants we have, has long been known; but the use of the chloride of aluminum for the same purpose has been probably overlooked in consequence of its not occurring as a waste product in any chemical industry. If, however, it should be required in a large quantity, it could be prepared from many highly aluminous slags, by treating them with sulphuric acid, after the removal of the silica, and then by mixing the sulphate of alumina with chloride of calcium by double decomposition, precipitating sulphate of lime, and leaving chloride of aluminum in solution. A cheaper way would be to take the commercial sulphate of alumina and common chloride of calcium for this purpose. On allowing the aqueous solution to evaporate at a very gentle heat and afterwards cooling, crystals of hydrated chloride are produced.

If an attempt be made to drive off the water from the hydrated chloride by the application of heat, decomposition will take place. Hydrochloric acid is evoked under these conditions, and oxychloride of aluminum is formed, and by finishing the process alumina is obtained as the ultimate fixed product.

That the chloride of aluminum has certain solvent properties for cellulose and other organic matters has been observed, and the use of salts of alumina in calico printing is one of the most ancient chemical processes known to the industrial arts.

If we really have a better antiseptic in the chloride of aluminum than we possess in carbolic acid and chloride of zinc, it is a discovery of great importance.

ALUMINA MORDANT FROM CRYOLITE FREE FROM IRON.

Since cryolite has become an article of commerce, its use has been extended to various industries in which it was not anticipated that it would ever play a part. It was originally supposed that the only possible value it could have would be as a source of metallic aluminum, but that use for it now amounts to nothing, while other applications have led to the importation into the United States of at least 5,000 tuns per annum of the mineral.

M. Hahn proposes to use cryolite as a source of a pure alumina mordant. He stirs up in water 100 parts of finely divided cryolite in 88 parts of milk of lime, and heats the mixture to boiling by steam, in a wooden tank that contains no iron.

The mineral is completely decomposed, the fluoride of calcium settles to the bottom, and the supernatant liquid is decanted. This consists chiefly of aluminate of soda, which he neutralizes with pyroligneous acid, and leaves to settle. After considerable time, and as soon as the liquid is perfectly clear, about two thirds of it are drawn off and evaporated to furnish acetate of soda. In the residue are one atom of alumina, and one atom of soda; to this is added one atom of acetic acid, and two atoms of concentrated sulphuric acid, and after agitation for considerable time, there will result a saline solution, composed of the double sulphate of soda and alumina, containing about 4 per cent of alumina. To obtain a neutral solution it is prudent at the outset to take less acid, and to have an excess of alumina in the wooden boilers.

The mordant thus prepared is absolutely free from iron; it becomes a jelly when heated, but remains liquid in the cold. One of the largest print works of Berlin prefers it to any alumina mordant in the market.

The fluoride of calcium resulting from the operation is employed as a valuable flux—it is, in fact, artificial fluor spar in a very fine state of division, and thus capable of intimate mixture with any mineral it is proposed to fuse with it. The acetate of soda obtained in the process can be used for the manufacture of pure acetic acid, or by heat can be converted into the carbonate. The fluoride of sodium can be used as a valuable reagent in the laboratory, or may be manufactured into caustic soda.

OZONE FROM RAPID COMBUSTION.

We mentioned at the time of its presentation the paper of Mr. Loew, of the College of New York, on the formation of ozone by rapid combustion. The publication of this paper led to considerable controversy in Europe, and a number of chemists reported the experiments. Carl Tham finds the observations of Mr. Loew to be correct.

A small quantity of ozone is always found in that part of the air which is immediately in contact with the lower part of the hydrogen flame, and its presence can be shown by drawing the air through a glass tube. The point of the tube ought to be inserted into the lower half of the flame, and the draft must be strong enough to divert the flame a little from the perpendicular, but not enough to draw the unconsumed gases through it, as they at once destroy the ozone. Burning charcoal yields no ozone for the reason that the carbon absorbs both atoms of oxygen to produce carbonic acid. This method of the formation of ozone is of great interest, and may eventually lead to its practical application in bleaching and disinfecting. It would appear to be a cheaper and better way to evolve the active oxygen than by electricity.

ACTION OF HOT VAPORS UPON WOOD.

Some interesting experiments have recently been tried upon the action of various vapors upon wood. If the vapor of bisulphide of carbon be passed over wood, the oxygen and hydrogen of the cellular tissue are expelled and pure carbon will be left behind. This carbon emits a metallic sound when struck, and if a wooden bell be carbonized in this way it will have the tone of silver. Wood carbonized in the vapor of alcohol yields a fibrous coke as white as silk.

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It would be interesting to extend the research to other vapors to see whether a coal could not be obtained of greater absorbing properties for gases, as well as of coloring matters, to be used as a substitute for bone black.

THE GRAPE SUGAR INDUSTRY.

During the year 1868, there were sixty establishments in Germany devoted to the manufacture of glucose, which produced 22,000,000 pounds of sirup, and 8,800,000 pounds of grape sugar. The starch employed in the manufacture was made from potatoes. In this country where corn is so cheap, the greater part of the starch for grape sugar is made from it in preference to potatoes. The consumption of glucose is constantly on the increase, as it is required in the manufacture of domestic wines.

American wines are deficient in sugar—they rarely contain more than 12 per cent, and this amount can only yield 6 per cent alcohol; it is therefore customary to make up the deficiency by the addition of grape sugar. Cane sugar was at one time employd for this purpose, but it had the effect of destroying the peculiar aroma and bouquet of the wine, and its use was abandoned.

OSMOSE.

Under this heading the editor of *Les Mondes* states that he has received intelligence from the large beet-root sugar manufactory at Arlowetz, Southern Russia, stating that the osmose process has been applied there under peculiarly favorable conditions, whereby, on the large scale 25 per cent of sugar has been obtained from the third crystallization, instead of only 8 per cent, as when the usual methods are applied.

FAIR OF THE AMERICAN INSTITUTE.

Some important additions to this exhibition have been made since our former writing, which greatly increase the attractions of the Fair. One of the principal additions is the Carré ice machine, exhibited by M. J. Bujac, 17 Broad Street, New York. It is impossible, without drawings and a lengthened description, to give the reader any definite idea of this remarkable invention.

The apparatus consists of a cylindrical, dome-topped, vertical boiler, into which the aqua ammoniæ is introduced, part of which enters an "exchanger," a "complement," and an "absorption vase." A large tube issuing from the dome connects it with a liquefactor, which is an extensive series of connected tubes, nearly horizontal, contained in a sheet-iron tank filled with cold running water. In this the gas, under the pressure and the cold, is liquefied, its latent heat being carried off by the cold water, whilst the liquefied ammoniacal gas passes out at the lowest end by a small tube, into a "recipient," where it collects. This vessel is connected by a tube with a "distributing valve," through which the liquefied ammoniacal gas expands into four stacks of zig-zag tubes contained in a "freezing cistern." The freezing cistern consists of a wooden tank lined with iron, in which are placed four lines of vertical zig-zag tubes, into which the volatile ammoniacal gas enters from the distributing valve. Between these tubes, twenty-four metallic cans, or freezers, filled with water are placed, and the whole interior of the tank is filled with a bath of strong brine, or, preferably, solution of chloride of calcium, which is incapable of being frozen by the temperature produced, and is made to circulate between the tubes and freezing cans, by a stirring apparatus. These stacks of zig-zags connect at bottom with a cylindrical tube, called the "collector." When now the distributing valve is partially opened, the liquefied ammoniacal gas is forced in due proportion into the zig-zag tubes, where it rapidly expands into gas by the assumption of the heat necessary for its vaporization from the surrounding brine, which in its turn abstracts the heat from the water in the cans (by virtue of which only it can retain its fluidity), and thus converts it into ice, and accomplishes the chief purpose of the machine. But the apparatus, acting continuously, now gathers the resulting ammoniacal gas, redissolves it in the weak aqua ammoniæ of the boiler which it has previously abstracted and cooled, and then returns it to the boiler to be again deprived of its gas.

The refrigerating power of this apparatus will surprise any one who is not familiar with its working. In a scientific, as well as practical point of view, it is the most instructive and interesting object of the Fair.

A decided novelty is the "Dynamometer Balance Wheel," exhibited by the inventors, R. B. Hamel and J. B. Holden. It consists of an independent loaded or weighted wheel, running and operating upon the inner surface of the rim of an outer wheel, and driven by a pinion attached to a shaft that works within the cylindrical shaft of the outer wheel. When the resistance is increased, the weighted wheel ascends higher up the rim of the outer wheel, and when it is decreased, it descends and stores the power applied, giving it out again when the resistance is again increased. This wheel is also designed to be used as a hoisting machine, in which application great efficiency is claimed for it.

The Union Stone Company, Boston, Mass., show a very fine collection of emery wheels and grinders, of excellent quality. These wheels are made by the Sorel process, that is, the emery is cemented by the use of oxychloride of magnesium, for which process this company own the American patents. The process is also applied to making window trimmings, building stone of all kinds of ornamental designs, soap-stone register rings, soap-stone faces for sadirons, billiard balls, etc., etc. A notice of this building stone, with full description of the process of manufacture, will be found in another column.

William Taylor & Sons, of the Columbian Iron Works, 25 to 39 Adams Street, Brooklyn, New York, show a small "Starkey" steam engine, which is very compact, and in some respects unique in design. On one end of a plain bed plate is securely bolted the steam cylinder, through both ends of which the piston rod passes—slides being dispensed with. The back end of the piston rod is keyed to a crosshead, to which are connected two side rods. These side connecting rods pass—one on each side of the cylinder—to a second cross head, which is connected to a crank by an ordinary stub end and strap. On top of the main steam cylinder, and at right angles to it, is a smaller cylinder, in which are the steam ports, with an ordinary valve, which is a sector of a circle. A steel shaft or rod passes through the center of the valve, and through the covers of the valve cylinder, in which are stuffing boxes for that purpose. On top of the valve are two set screws, to regulate the pressure of the valve on its seat. Attached to the valve shaft is an arm running parallel with the piston rod, and connected to one of the side rods by a link, so that the connecting rod will communicate to the valve the required motion to open and close the ports of the engine. When the crank passes the centers, its rapid rising and falling motion opens the ports quickly; and when the crank is at half stroke the rods move in nearly a horizontal line, keeping the valve wide open, so that the full power of steam is obtained. By the peculiarities of this simple movement the steam is admitted to the steam cylinder at that part of the stroke where it is most wanted, and cut off where not wanted.

Severance and Holt, 16 Wall street, New York, show a splendid Leschot's Patent Diamond-pointed Steam Rock-Drilling Machine. These machines were fully described and illustrated on page 282, Vol. XII., of the SCIENTIFIC AMERICAN. The one exhibited, however, presents an improvement on the machines described in the article referred to, the feed gear being modified so that the drill can be run down as fast as it can be withdrawn, which in deep boring saves much time.

William W. Tupper & Co., No. 206 West street, New York, show several sizes of their patent sectional grate and grate bars. These grates are adapted to all kinds of fuel, and especially for the consumption of small nut or pea coal, where the largest amount of air opening is desired. They have met with a well-deserved and gratifying success, having been, we are told, supplied to over 5,000 different steamers, factories, etc.

A model and drawing of an iron steamer, designed to make the trip from New York to Liverpool in six days, combining this high rate of speed with perfect sea-going qualities, first-class passenger accommodations, and large carrying capacity, is shown by W. W. Vanderbilt, Naval Architect and Consulting Engineer, 569 Broadway, New York. The dimensions of this vessel are as follows: Length on water line, 500 feet; beam at water line, 60 feet; do. over launch, 93 feet; depth of hold, 32 feet; number of decks, 5; total tunnage, 8,000 tuns; freight capacity, 4,000 tuns; coal capacity, 2,000 tuns; draft of water, 18 feet 4 inches. The vessel is intended to carry two vertical beam engines, 100 feet apart; cylinders, 110 inches diameter and twelve feet stroke. The ship is to be propelled by four side wheels, the forward wheels to be 40 feet in diameter, and the after wheels 45 feet.

The powerful organ exhibited by Jardine & Son, is an instrument of remarkable power and brilliancy of tone.

But of all the things shown, that which will most attract those interested in naval sports, is the case of silver ware exhibited by Tiffany & Co., 550 and 552 Broadway, New York. It contains all the cups contested for in the recent yacht races. We give a list of the articles shown: The Queen's cup, won by the *America*, in 1851, and still retained by the New York Yacht Club; the cup won by the *Phantom* in the contest with the *Cambria;* the cup presented to the New York Yacht Club, by Com. James Ashbury, owner of the *Cambria*, and won by the *Magic;* the cup won by the *Cambria;* Newport citizens' prize cup, won by the *Phantom;* and specimens of the elegant designs for which the above firm are widely celebrated.

Edward D. McCracken, 617 Sixth Avenue, New York, shows an alternating battery, so constructed that two series of elements alternate with each other in their action, without any rupture of the circuit. Clock-work revolves a circuit changer, which alternately passes the current around each of the two electro-magnets, so that an armature is alternately drawn to each. This armature forming part of both circuits, is provided with two springs, one of which reaches the poles of one of the magnets before the other is removed from the poles of the other magnet. The two series of elements therefore act together for an instant, while the change is making. It is claimed that rest given to each series of cups, by this arrangement every five or six minutes, greatly increases the power of the battery.

CORRECTION.—Canfield's elevator was incorrectly described in our issue of October 8th, and as injury might therefore result to the proprietor, we gladly make a correction at this time. This elevator is a self-sustaining, hand-hoisting machine, with automatic brake by which the platform and load are retained at any point—the hoisting rope freeing the brake whenever lifting, and the lowering by check line being under perfect control. The machine is a very ingenious, simple and reliable one, and we regret that injustice was done it through information obtained from an unreliable source. This elevator was described and illustrated in No 1, Vol. XXI., of the SCIENTIFIC AMERICAN, a fact of which our reporter was unaware when the notice referred to was written. The elevator is shown by F. P. Canfield, 71 Sudbury street, Boston, Mass.

IT is the design to establish, in connection with the Louisville Medical College, a complete analytical laboratory, to be kept open nine months in the year, where students can pursue practically a complete course in qualitative and quantitative analysis and pharmacy.

NEW BOOKS AND PUBLICATIONS.

THE MEDICAL ADVISER. A Full and Plain Treatise on the Theory and Practice of Medicine, especially adapted to Family Use. By Rezin Thompson, M.D., Permanent Member of the American Medical Association, and Author of "Thompson on Fever," etc. National Publishing Co., Cincinnati, Ohio, and Memphis, Tenn. Jones, Junkin & Co., Chicago, Ill.

This is one of those popular treatises on medicine with which the country has been supplied from time to time, and the usefulness of which is open to grave doubt. It is indeed very questionable whether the tinkering amateur doctoring, which results from the introduction and perusal of such books in families, does not do more harm than good, and it is quite certain that many such books are written in a style that renders them totally unfit to be placed in the hands of youths or read aloud in the family, as the author of this work states in his preface, this one is designed to be. This book is certainly not one that we should deem fit to be so read, or one which we should expect would improve a youth if read privately. If certain subjects connected with human physiology are to be discussed at all, they should be discussed in the plainest manner. A spade should be called a spade. All attempt at imagery or facetious allusion which may tend to excite a prurient imagination should be totally avoided. The author of this book evidently has lacked the skill and courage to treat subjects connected with the reproductive organs in this way. Meig's treatise on "Obstetrics" would, in our opinion, be a far less objectionable book to read in a family than this. What shall we think of an author who, in writing a work for family reading, pens such a paragraph as the second on page 851 of this work; italicizing what he evidently deems humorous allusions to delicate subjects, and tainting the whole passage with prurience by such a course. Better, a thousand times, have stated everything with detailed plainness than to thus sham a delicacy which the style of the paragraph shows the writer to be incapable of feeling. There are also evidences in the work that the author is not on the level which modern physiology has reached, in regard to this subject. In regard to the catamenia, our author evidently believes in heroic compulsion, whenever the discharge fails to take place in young females, regardless of the condition of the constitution, and whether regularly occurring ovulation demands the discharge. Those who purchase this work and endeavor to follow the author's directions in cases of this kind, will assume risks they will be wise to avoid. If doctoring is to be done at all, let it be done by skilled physicians, and let no one be encouraged by such works as this to become self-appointed tinkers of health. The book is a large octavo, very much larger in our opinion than is necessary to contain all the useful information we find in it.

SCHOOL-HOUSE ARCHITECTURE. Illustrated in Seventeen Designs in various Styles, with full Descriptive Drawings in Plan, Elevation, Section, and Detail. By Samuel F. Eveleth, Architect. New York: Geo. E. Woodward, 191 Broadway.

This is entirely a book of designs, with detail drawings and full specifications. The designs are all good, and in some cases very elegant. The work is published in the fine style which characterizes the well-known architectural works of its publisher. It is in quarto form, handsomely bound, and will be found a useful work not only to architects, but to all interested in the construction of school buildings.

A SET OF ALPHABETS of all the Various Hands in Modern Use, with Examples in each Style, designed as a Text-Book. By Frederick S. Copley. New York: Published by Geo. E. Woodward. 191 Broadway.

This book contains a collection of most beautiful designs, which will be found of great service both to young and to experienced draftsmen. The mechanical method of constructing letters in various styles is illustrated and described in full, in a clear and definite manner, and special attention is paid to cyphers and monograms. The book is got up in splendid style and is very ornamental as well as useful.

SPECIAL INSTRUCTOR ON LUMBER SURVEYING, for the Use of Lumber Manufacturers, Surveyors, and Teachers. By Charles Kinsley, Practical Surveyor and Teacher of Surveying. Published by the Author, Calais, Me., and St. Stephen, N. B.

This is a good little book, and will be found a valuable guide on the subjects of which it treats.

LINEAR PERSPECTIVE. For the Use of Schools and Students in Surveying. By Joseph Ropes. Fourth Edition. Philadelphia: J. B. Lippincott & Co.

Inventions Patented in England by Americans,

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,904.—REDUCING IRON OR IRON ORES.—J. Y. Smith, Pittsburgh, Pa. July 5, 1870.

2,147.—CUTTING, BORING, GRINDING, AND PULVERIZING STONE, ETC.—B. C. Tilghman, Philadelphia, Pa. August 1, 1870.

2,364.—MACHINE FOR MAKING PAPER BAGS.—M. E. Knight, Boston, Mass August 29, 1870.

2,368.—LITHOGRAPHIC PRINTING MACHINE, AND APPARATUS FOR PREPARING THE STONES USED IN LITHOGRAPHING.—R. M. Hoe, New York city. August 29, 1870.

2,382.—METAL OR ALLOY.—J. C. Booth, Philadelphia, Pa. September 1 1870.

2,388.—TETHER.—J. W. Upson, Tallmadge, Ohio. September 1, 1870.

2,397.—PUDDLING FURNACE.—S. Danks, Cincinnati, Ohio. September 2, 1870.

2,335.—APPARATUS FOR WORKING BRAKES FOR RAILROAD CARS AND FOR WORKING FEED-WATER PUMPS IN CONNECTION THEREWITH.—G. Westinghouse, Pittsburgh, Pa. August 11, 1870.

2,269.—DISINFECTANT AND INSECT OR VERMIN REPELLER.—C. H. Jackson New York city. August 16, 1870.

2,273.—BALE TIE.—E. P. Jones, Sunflower county, Miss. August 17 1870.

2,327.—PAVEMENT.—A. G. Day, Seymour, Conn. August 24, 1870.

2,363.—PROCESS FOR FORMING VACUUM IN FREEZING APPARATUS.—G Parker, Meriden, Conn. August 29, 1870.

2,381.—APPARATUS TO BE EMPLOYED IN OPERATING SEWING AND OTHER MACHINES.—E. J. Leyburn, Lexington, Va. August 31, 1870.

2,385.—PERMANENT WAY OF RAILWAYS.—D. R. Pratt, Worcester, Mass. September 1, 1870.

2,392.—MACHINERY FOR WASHING WOOL.—John and William Yewdall, Philadelphia, Pa. September 2, 1870.

2,402.—MACHINE FOR WEAVING HATS.—J. Van D. Reed, New York city September 2, 1870.

2,409.—SHAFTING AND MACHINERY FOR TRANSMITTING POWER.—J. B. Morrison, St. Louis, Mo. September 3, 1870.

2,410.—KNITTED FABRIC AND MACHINERY EMPLOYED THEREIN.—H. A. Clark, Boston, Mass. September 3, 1870.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

SHIRTS.—S. H. Strouse and Joseph Strouse, New York city, has petitioned for the extension of the above patent. Day of hearing Dec. 7, 1870.

PAPE-PULP ENGINE.—Joseph Kingsland, Jr., Franklin, N. J., has for an extension of the above patent. Day of hearing Dec. 7, 1870.

HORSE RAKE.—John J. Squire, De Soto, Mo., has applied for an extension of the above patent. Day of hearing Dec. 7, 1870.

MACHINE FOR CUTTING VENEERS FROM THE LOG.—Joseph H. Goodell, Logansport, Ind., has petitioned for an extension of the above patent. Day of hearing Dec. 7, 1870.

PROCESS OF GRINDING PAPER PULP.—Joseph Kingsland, Jr., Franklin, N J., has petitioned for the extension of the above patent. Day of hearing Dec. 7, 1870.

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It is Said

That every extensive advertiser has to pay a very large sum or experience before he learns how to invest his money judiciously. It would be better to intrust the business to a responsible Advertising Agency, like that of Geo. P. Rowell & Co., No. 40 Park Row, New York, and thus gain the benefit of experience without cost. Contracts can be made with them as low as with publishers direct.

No One Doubts

The value of a Patent Universal Clothes Wringer, and no one, after one trial, will find less reason for doubting the value of a Doty Washing Machine. If one is complete and labor-saving, so is the other.—[Cleveland (Ohio) Farmer.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

L. M. V., of Mass.—The following are recipes for making gun-cotton for photographic and other purposes:—No. 1. Take of cotton 1 oz., sulphuric acid 5 fl. oz., nitric acid, 5 fl. oz.; mix the acids in a porcelain mortar, immerse the cotton in the mixture, and stir it for three minutes with a glass rod, until thoroughly wetted. Transfer the cotton to a vessel of water, stir well with a glass rod, decant the liquid, pour more water on the mass, and repeat the process until the washing ceases to give a precipitate with chloride of barium. Drain the product on filtering paper, and dry in a water bath.—No. 2. Mix 4½ oz. of pure, dry nitrate of potash with 30 fluid drachms of sulphuric acid (sp. gr. 1·845), and stir into this mixture carefully 120 grains of best carded cotton. As soon as saturation is complete (in about one minute, if proper care has been used), throw the cotton into a large pan of clean rain water, and change the water repeatedly until litmus ceases to show the presence of acid, then squeeze it in a cloth, and, after being well pulled out, dry it at a temperature of about 180°.—No. 3. One part of finely carded cotton is immersed in 15 parts of a mixture of equal measures of nitric acid, of specific gravity 1·52, and sulphuric acid of specific gravity 1·845. The cotton must be completely immersed in the mixture, otherwise it becomes so hot as to undergo instant decomposition. After a few minutes' immersion it must be plunged into a large volume of cold water, and then washed so long as the least trace of acid is perceived, when the moist mass is placed upon litmus paper. It is then to be carefully dried at a temperature below 212° Fah. When prepared for military purposes it is found advisable to prolong the immersion in acid for forty-eight hours, and to continue the washing for several days. As thus prepared gun cotton scarcely differs from unchanged cotton in appearance; it is white and fibrous, and rather harsh to the touch.

R. B., of Mass.—We think that in projecting a ball with line attached from a howitzer, as is done in case of shipwreck, the line would modify the law which gives greatest range at 45°, and probably reduce this angle in order to get the longest range. We have, however, nothing but opinion to offer on this subject, perhaps some of our correspondents may have experience. Zinc is a preventive of rust in steel or iron when brought in contact with the latter metals. The dentist who keeps his steel tools in a zinc box is right in so doing. A few zinc rivets inserted in a steel square will keep the steel bright in spite of moisture from the hands, etc. The cause is that owing to the different electric conditions maintained between iron and zinc, when placed in contact the zinc is oxidized, and the iron is kept bright at the expense of the zinc.

J. S., of Nova Scotia.—Put the rusted horseshoe nails into a tumbler, a stout barrel with pivots in the centers of the heads, and a hole cut in the side with a lid fitted to it, will do. Put in some sharp sand and leather cuttings—waste from shoemakers' shops—and the nails. Set the barrel revolving slowly, and let them scour till they are as bright as you want them. Finish with leather cuttings without the sand.

E. S. H., of Ill., thinks if R. L. C., of Connelsville, Pa., will examine the bulb of his thermometer he will find a diminutive crack in it, which will account for the curious freak desecribed by him. This is undoubtedly the true cause of the mischief.

J. S., Jr., of Mass.—No one has been able to answer any ultimate "why," in all the existence of which we are cognizant. We are able scientifically to determine *how* things are, but science knows nothing, nor never—from the nature of things—*can know* the why. Speculation attempts to supply "*whys*" by hypotheses. Faith takes them on trust.

W. M. M., of Mich.—The solution to problem 1, of mechanical movements, published on page 71, current volume, is correct, but it is not new. Problem 2 is correctly solved. Your devices claimed to be solutions of problems 3 and 4, will not work in practice.

J. W. H., of N. Y.—The solution you sent us is a correct one though not new. There must have been a mistake in the answer to which you refer, probably in the number of the problem referred to, and perhaps you mistook the initials of another correspondent for your own.

J. K., of Ohio, wishes to know how shell ornaments are polished. We suppose he means the inlaid shell work, mother of pearl, etc First reduce to a flat surface by filing and scraping. Then rub with pumice stone, follow with a rubbing with putty powder, and finish with a buff-stick and rotten stone moistened with diluted sulphuric acid.

J. D., of Wis., is a dealer in eggs and butter. He wishes to get the best recipes for the keeping of eggs fresh during the summer months, and a recipe for coloring butter. We have no doubt some of our correspondents can give the most recent and improved practice in these matters.

W. H. L., of Pa., and his neighbors are greatly troubled with small "red ants," which infest all the rooms of their houses. Can any one who has been thus tormented, and who has found a remedy give information how to rid houses of these insects?

N. K. B., of N. Y.—Put a few drops of carbolic acid solution on the leaves in various parts of the old book which has the musty smell, and close the book for a few days until it becomes thoroughly impregnated with the odor. This will destroy the musty smell.

E. S. G., of West Indies.—Any process by which the particles of two pieces of metal can be brought within the range of the attraction of cohesion, and thus joined, may be properly called welding.

C. L., of Mo.—Were we to keep such a liquor as lager beer in anything but wood, we should prefer tin plate for the material of which the vessel was to be made, and to use a tap of block tin or pewter.

W. E., of N. Y.—You can not find all the information you wish in any one treatise. You should send for catalogues of the publications of various industrial publishers, and select such as treat on the subjects named.

W. K., of D. C., wishes practical dyers and cleaners to inform him how discolorations of clothing produced by urine can be remedied.

CITY SUBSCRIBERS. — The SCIENTIFIC AMERICAN will be delivered in every part of the city at $3·50 a year. Single copies for sale at all the News Stands in this city, Brooklyn, Jersey City, and Williamsburgh, and by most of the News Dealers in the United States.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notice exceed Four Lines, One Dollar and a Half per Line will be charged.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4·00 a year. Advertisements 17c. a line.

Belting that is Belting.—Whenever Wanted always send for the Best Philadelphia Oak-Tanned, to C. W. Arny, Manufacturer, 301 Cherry st., Philadelphia.

For Fruit-Can Tools, Presses, Dies for all Metals, apply to Mays & Bliss, 118, 120, and 122 Plymouth st., Brooklyn, N. Y. Send for circular.

E. A. Dayton, Richmond, Va., sells all kinds of wood-working and other machinery, steam engines, etc., at Manufacturers' Prices. Southern Buyers will save money purchasing there.

Musical readers will notice the announcement of the Messrs. Smith, in another part of this paper.

"The Technologist," the great illustrated industrial monthly, devoted to Engineering, Manufacturing, and Building. 40 pages, $2 per year; single copies 20c. Advertisements 40c. a line. Address Theodore R. Thieler, "Technologist," 176 Broadway, New York. Agents Wanted.

Broughton's Lubricators do not need any cock to draw off water, as steam does not condense in them In this, and other respects, they are superior to any other. Made by H. Moore, 42 Center st.

Practical Treatise on Soluble or Water Glass, just published. Price $3 20, mailed free, by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Valuable Patents exchanged for cash, real estate, or other property. Communications desired from both property owners and patentees. E. E. Roberts & Co., Consulting Engineers, 15 Wall st., New York. See advertisement in big type.

Swingle's Patent Combined Boring and Mortising Machine. It bores and mortises at one operation. Having had this in constant use for several years, at our own works, we guarantee its giving satisfaction. Price $150. Built by the Allen works, cor. Jay and Plymouth sts., Brooklyn, N.Y., bet. Catherine and Bridge st. ferries. Illustrated circulars sent on application.

A French gentleman, speaking English, seeks an engagement in a railway or engineer's office; is fully qualified as Draftsman, Mathematician, and Accountant, having had great experience in the above branches in several European offices. First-rate city references. Address C. P., 103 MacDougall st., New York.

Practical and Scientific Books for Mechanics, Manufacturers, Chemists, and others. Henry Carey Baird, Industrial Publisher, 406 Walnut st., Philadelphia. Catalogues by mail, free of postage.

Lubricating Packing, for spindles and journal-box bearings, No oil required. Address The Manhattan Packing Manufact'g Co., 1,360 Broadway, New York.

Wanted.—Parties manufacturing barn-door rollers will please send their address to T. F. Hamilton, Geneseo, Ill.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau st., N. Y.

For foot power engine lathes address Bradner & Co., Newark, N.J.

For Am. Twist Drill Co.'s Patent Grinders, and other fine tools, address J. W. Storrs & Co., 252 Broadway, New York.

Parties in need of small Grey Iron Castings please address Enterprise Manufacturing Co., Philadelphia.

Excelsior Stump Puller & Rock Lifter. T. W. Fay, Camden, N.J.

For Sale—One half the interest in McGee's Patent Self-boring Faucet. Address T. Nugent, Morristown, N. J.

Pattern Molding Letters to put on patterns of castings. Wholesale and retail, by H. W. Knight, Seneca Falls, N. Y.

Propeller Engine Cylinders, 28 inches square, for sale cheap, by Daniel W. Richards & Co., 92 Mangin st., New York.

Pictures for the Drawing Room.—Prang's "Lake George," "West Point," "Joy of Autumn," "Prairie Flowers." Just issued. Sold in all Art Stores. "Three Tom Boys." "Bethoven," large and small.

Roofing Materials, House Sheathing, Roofing Felts, & Psints, full directions for applying. Mica Roofing Co., 73 Maiden Lane, New York.

Building Felt (no tar) for inside & out. C. J. Fay, Camden, N. J.

Screw Wrenches.—The Best Monkey Wrenches are made by Collins & Co. All Hardware dealers have them. Ask for Collin Wrench.

Profitable Canvassing.—"Universal Sharpener," for Table Cutlery and Scissors. A correctly beveled edge can be obtained See Adv't.

Blind Stile Mortising and Boring Machine, for Car or House Blinds, fixed or rolling slats. Martin Buck, Agent, Lebanon N. H.

Best Boiler-tube cleaner—A. H. & M. Morse, Franklin, Mass.

"Your $50 Foot Lathes are worth $75." Good ones for all. At your door. Catalogues Free. N. H. Baldwin, Laconia, N. H.

The Best Hand Shears and Punches for metal work, as well as the latest improved lathes, and other machinists tols, from entirely new patterns, are manufactured by L. W. Pond, Worcester, Mass. Office 98 Liberty st., New York.

One 60 Horse Locomotive Boiler, used 5 mos., $1,200. Machinery from two 500-ton propellers, and two Martin boilers very low. Wm. D. Andrews & Bro., 414 Water st., New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Keuffel & Esser, 116 Fulton st., N.Y., the best place to get 1st-class Drawing Materials, Swiss Instruments, and Rubber Triangles and Curves.

Glynn's Anti-Incrustator for Steam Boiler—The only reliable preventative. No foaming, and does not attack metals of boiler. Liberal terms to Agents. C. D. Fredricks, 587 Broadway, New York.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlin, Pittsburgh, Pa.

For mining, wrecking, pumping, drainage, and irrigating machinery, see advertisement of Andrews' Patents in another column.

It saves its Cost every sixty days—Mitchell's Combination Cooking Stove. Send for circular. R. B. Mitchell, Chigo, Ill.

Incrustations prevented by Winans' Boiler Powder (11 Wall st. New York,) 15 years in use. Beware of frauds.

To ascertain where there will be a demand for new machinery or manufacturers' supplies read Boston Commercial Bulletin's manufacturing news of the United States Terms $4·00 a year

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SEED PLANTER AND GUANO DISTRIBUTER.—W. L. Trayuham, Warrenton, Ga.—This invention has for its object to furnish a simple, convenient and effective machine for planting seeds and distributing guano and other fine fertilizers, which shall be so constructed as to adapt it for attachment to an ordinary plow.

HORSE POWER.—Lewis A. Peter, Neffs, Pa.—This invention has for its object to furnish an improved horse-power, simple in construction, effective in operation, strong, durable, and not liable to get out of order, and which will enable the same amount of work to be done with a less number of horses than ordinary horse-powers.

SEMOLINA MILL.—Gustav A. Buchholz, Regents Park, England.—The object of this invention is to convert grain, by a kind of shearing action, into semolina, or into flour. This is effected by the use of an arrangement of machinery wherein the grain is passed between the cutting surfaces, resembling, in arrangement, the upper and lower stones of a flour mill, the runner, however, taking, by preference, the place of the bed or lower stone.

MATS OR FLEXIBLE RACKS FOR CAR FLOORS, ETC.—Samuel Lewis, Williamsburgh, N. Y.—This invention has for its object to furnish an improved mat, or flexible rack, designed especially for application to street-car floors, and other similar purposes, which shall be so constructed that it may be readily rolled up for transportation, or storage, or to remove it from its place for sweeping and cleaning purposes.

COOKING STOVE.—John H. Jones, Memphis, Tenn.—This invention relates to improvements in cooking stoves, and consists in an improved arrangement of the application of vaporizing burners, for burning gasoline and other like substances, for heating at different points without heating up the whole stove, as is the case when coal or other solid fuel is used; also in improved vaporizing burners for the same, and also in an improved arrangement of the water boiler.

EGG BEATER.—D. M. Swartz, Lewisburg, Pa.—This invention relates to improvements in egg beaters, and consists in an adjustable clamping or attaching apparatus, for attaching to vessels of different sizes across the top, also, an adjustable attachment of the operating parts to the said support for adjusting the said operating parts to the centers of the vessels of different sizes, and, also, in an extension beater shaft, whereby the beaters may be raised or lowered in the vessel, according to its depth.

BUFFING DEVICE.—Henry Barrett, Brooklyn, N. Y.—This invention relates to an improved buffing device for finishing spoons, and consists in the application to the large buffing wheels now commonly used, and arranged for attachment to the spindle of a lathe, of a short spindle, on which is mounted, a little distance from the side of the said large wheel, a small buffing wheel, adapted for polishing the inner surface of the bowl of the spoon, the said wheel being detachably connected to the spindle so that others, of different sizes, may be attached.

MACHINERY FOR MANUFATURING SEMOLINA AND FLOUR.—Gustave A. Buchholz, Regents Park, England.—This invention consists in a novel arrangement of the pairs of acting rolls, which cut up and reduce the grain supplied to them, which admits of the rolls being driven from central spur gearing, and this renders the construction of the machine very compact and less costly than heretofore. The pairs of ripping and cutting rolls, say, for example, six in number, are set around a common center, and at such a distance therefrom as to allow of the inner or near roll of each pair being driven directly from a central gear wheel.

SHUCK HACKLING MACHINE.—Tappey, Lumsden & Steel, Petersburgh, Va.—This invention relates to improvements in machines for hackling corn shucks, and other like substances, and consists in an arrangement of one large toothed cylinder, having the teeth arranged in sections with spaces between, two concaves or fixed-toothed parts of the case, and a revolving rake between the said concaves, or fixed-toothed parts of the case, all in a manner calculated to be more efficient in operation than the common arrangement of these machines with two toothed cylinders.

COTTON CULTIVATOR.—P. R. Leatherman, Woodville, Miss.—This invention relates to improvements in machines for cultivating cotton, and consists in an improved arrangement on a frame, provided with two sets of wheels, and arranged for ready adjustment upon either set, of a vertically-adjustable plow and scraper-support, carrying plows arranged to be set to throw away from or up to the rows, as required. It also consists in an improved construction of one set of wheels, and the arrangement of the same relatively to the plows, in a way to facilitate guiding the machine.

BUFFING MACHINES.—S. D. Tripp, Lynn, Mass.—This invention relates to improvements in buffing or sand-papering machines such as are used for sand-papering the soles of boots and shoes. It consists in an arrangement, at one end, of a case mounted on a frame in any suitable way, and provided with a fan blower and discharge nozzle at the other, of a set of sand-papering rollers, and a brushing roller, mounted on a revolving mandrel, placed along a slot in the end of the case through which the air is drawn by the fan, so as to take with it the dust formed by the sanding rolls acting on the leather and convey it away from the operator.

STEAM TRAP.—S. D. Tripp, Lynn, Mass.—This invention relates to improvements in traps for the escape of the waters of condensation in steam heating and other pipes, and consists in an arrangement of a receiving vessel, into which the water is allowed to flow, on a weighted balance beam, and with a valve at the bottom, opening inward, which will be opened, when the weight of the water carries the vessel down, by the stem which projects through the discharge tube of the vessel coming into contact with any suitable stop to prevent the valve going down with the vessel, but which will resume its position on the valve seat after the discharge of the water, when, by reason of the superior gravity of the weight, the vessel is raised again.

AUTOMATIC VENTILATOR.—B. F. Prentis, Benwood, West Va.—This invention relates to a new apparatus for adjusting the slats on roof-ventilators, so that the same are closed to the windward and open to the leeward.

SHEARS FOR CUTTING FLOWERS, PRUNING, ETC.—J. W. Barbour, Winooski Falls, Vt.—This invention has for its object to so construct shears for the cutting of flowers, herbs, etc., and for pruning purposes, that the pieces cut will be held in said shears, and not allowed to drop.

SPRING MATTRESS.—Charles Fulton, New York city.—This invention relates to a new mattress, composed of springs, in such a manner that its entire surface will be formed and occupied by the springs, no intervals being left between the same.

COMBINED HORSE-POWER AND BALING PRESS.—Charles A. Wright, Rodney, Miss.—This invention relates to a new press for baling hay or cotton, and has for its object to materially simplify the construction of the apparatus, and to provide for a more rapid mode for baling than could heretofore be produced.

SLEIGH LOCK.—Freeman Talbot, Cleveland, Minn.—The object of this invention is to provide efficient means for "holding" loaded sleighs when stopped on the side of a hill or for obstructing the movement of such sleighs when descending hills, thereby relieving the team and preventing accidents.

PERFUMED PARASOL AND CANE HEAD.—Albert Wanner, Hoboken, N. J.—This invention relates to a new and improved device for rendering parasols and canes more desirable as articles of sale and use.

GANG PLOW.—James Wilson Treadway, Crown Point Centre, N. Y.—This invention has for its object to furnish an improved gang plow, simple in construction, and effective in operation, and which shall be so constructed that the plows will adjust themselves to the surface of the ground so as to work at the same depth upon uneven and level ground, and so that the plows may be raised from the ground independently or altogether, as may be required.

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SAWING MACHINE.—Fred. J. Stevens, Columbia, N. H.—This invention relates to a new mechanism for reversing the motion of a saw mill carriage and for adjusting the log on the head-block, so that the saw can be made to cut during both movements of the carriage or only during the forward motion of the same. The invention is more particularly applicable to clapboard machines, and can be readily adjusted for cutting boards of any suitable thickness.

POTATO DIGGER.—William Dillon, Sonoma, Cal.—This invention has for for its object to furnish an improved machine for digging potatoes, which shall be simple in construction, strong, durable, effective in operation, and easily adjusted to work at a greater or less depth in the ground, as may be required.

DEVICE FOR OPENING AND CLOSING FANS.—George Bordes, New York city.—This invention has for its object to furnish an improved device for opening and closing hand-fans, which shall be simple in construction, effective in operation, easily operated, and not liable to break or get out of order.

MOLDING FOR SECURING CARPETS.—John H. Stanton, Franklin, Ohio.—This invention has for its object to furnish an improved means for putting down a carpet evenly, and holding it securely, and which shall be simple in construction, and easily and quickly applied.

ROTARY ENGINE.—Henry Jamieson, Williamsburgh, N. Y.—This invention relates to a new construction of valve gear for a rotary engine of suitable kind, and to a novel mechanism for regulating and reversing the motion of said engine.

RAILWAYS.—George Augustus Huddart, Brynkir, England.—The object of this invention is to provide an efficient support for the joints of railroad rails, and consists in the use of a trough coupling into which the ends of the rails to be joined are inserted, the end of one rail being permanently attached to the trough, and the end of the other being made fast by bolts and nuts and usual.

CAST STEEL FOR THE CONSTRUCTION OF PLOW SHARES AND CULTIVATOR TEETH.—William H. Singer, Pittsburgh, Penn.—This invention consists in producing an improved article of of cast steel, for plow shares and cultivator teeth, by recarbonizing ingots of mild-tempered cast steel (in place of carbonizing ordinary cast iron, as heretofore). The ingots are placed in a converting furnace for several days, and then allowed to cool gradually, so as to possess the requisite toughness of core, combined with the desired hardness of exterior or surface.

SUBSOIL PLOW.—L. V. B. Martin, Tuscaloosa, Ala.—This invention relates to subsoil plows, and consists in improving the general construction of the plow.

PERMUTATION LOCK FAUCET.—Wm. F. Jones, Baltimore, Md.—This invention relates to an improvement in lock faucets, and consists in the combination of a permutation lock of peculiar construction with a faucet, for the purpose of preventing any person unacquainted with the index to the lock, from drawing off the contents of the vessel in which the faucet is used.

FERTILIZER DISTRIBUTER.—J. J. Singleton, Forsyth, Ga.—This invention relates to a new apparatus for distributing guano and other fertilizing matter, and for drilling small grains and seed. The invention consists chiefly in the use of a horizontal distributing wheel or disk, and in the connection therewith of a regulating gate and discharge tube.

STEAM ENGINE.—Frank E. Kirby, New York city.—The object of this invention is to provide simple and efficient means for varying according to the load or speed of the engine, the position of the cut-off valves over the ports, and on the back of the main slide valve, by means of which the requisite quantity of steam may be measured out for each stroke of the engine, according to the load or power required.

COLORTROPE.—Oscar Nicholson, New York city.—This invention has for its object to furnish a simple and amusing toy, called by me a colortrope, and which shall be so constructed that by giving to it a rapid rotary motion, the colors of the different wheels or disks may blend together, producing beautiful combinations of color.

GENERATING STEAM.—S. B. B. Nowlan, New York city.—This invention relates to a new and useful improvement in apparatus for generating steam for various purposes.

PLOW.—J. R. P. Jett, Knoxville, Texas.—This invention has for its object to furnish an improved plow, which shall be so constructed that it may be readily adjusted for plowing sandy soils, or clayey or alluvial soils, as may be required, by simply exchanging moldboards.

SYRINGE.—George Conover, Mott Haven, N. Y.—This invention relates to a new and useful improvement in compression syringes for injecting liquids, and consists in combining with the elastic syringe a stop valve by means of which the liquid may be retained in the syringe, and in an arrangement whereby the liquid may be withdrawn, after having been injected.

METAL COMPOUND FOR BEARINGS.—T. S. Davis, Bristol, England.—Zinc or spelter is used as the basis or chief ingredient, and he adds thereto copper, tin, and nickel silver. These metals may be mixed in varying proportions and in different manners without materially affecting the result.

TURNING OVER MUSIC-BOOK LEAVES.—H. Crowther, Leeds, England.—This consists in the construction of a case or box, having within its inner circumference a projection all round the upper angle of the box, the box itself being attached to the top or inside front of the piano. In front of the box a spindle is placed, free to turn partially on its axis, and supported on bearings. In front of the box, and partially within it, is a hollow cylinder to receive a spring which operates upon the spindle before mentioned. The upper part of the spindle has a slot in it, through which an arm passes the arm being allowed to rock in the slot upon a pivot passing through it and the spindle.

UMBRELLA.—J. Raphael, Mile End, England.—The inventor inserts the ends of the ribs into the inner side of the top notch wheel or notched piece, apertures being formed therein for the purpose. The inner side of the ends of the ribs bears and works against the stick of the umbrella, parasol, and sunshade, or against a tube or ring embracing the stick; and the ribs at that part are retained in place, though free to work, by the stick and the top notch-wheel or notched piece.

ARTIFICIAL FLOWERS.—O. E. Fillion, Paris, France.—The inventor makes artificial flowers with a composition consisting of about 100 parts by weight of collodion, twelve parts of castor oil, and one or two parts of glycerin. When he desires to produce a very fine white he uses a composition consisting always by weight of 100 parts of collodion; ten parts of Venetian turpentine may, however, be varied if desired.

SELF-ATTACHING CORSET STEEL.—W. A. and H. E. Starrett, Lawrence, Kansas.—This invention consists in an apparatus for readily attaching corset steels to corsets, or detaching them therefrom, for the purpose of enabling the manufacture of the one to be entirely detached from that of the other, and of enabling the steel to be used with any style of corset.

MEANS FOR TRANSMITTING POWER.—R. W. Norwood, Courtland, Ala.—This invention consists in the application of an intermediate system of levers between a shaft rotated directly by the piston of a steam engine and a fly wheel from which machinery may be driven.

ORE WASHER.—Edwin Platt, Charleston, S. C.—This invention relates to an apparatus in which ore, thrown into a receiver, falls thence into an inclined pipe, where it is caught by jets of water forced into the pipe through nozzles by a powerful steam pump, by which jets the ore is carried upwards into a chamber having an inclined bottom, there being in said chamber a perforated barrier, against which the current of ore and water is dashed, and beneath which it passes, a portion of the water with some of the dirt also rushing through the perforations of the barrier, and the whole mass flowing onwards to an inclined trough whose upper end opens into the lower corner of the chamber, which trough the ore and water enter, and from which the water escapes through perforations in its bottom, while the ore falls to its lower end, and is removed, if cleansed, and if not it is sent into the same or another receiver for the purpose of undergoing second washing process similar to the first.

GRAIN BAND FASTENING.—Geo. W. Osborn, Parkville, Mich.—It consists of a metallic tag which may conveniently be of oval shape, having a hole near one end through which the binding cord is passed and then tied to the tag, the latter being also provided with a curved slot opening into one side of the tag, the sides of which slot converge until they meet at its inner end; the said slot serving to receive the cord and hold it securely after it has been drawn tightly around the gavel.

BEDSTEAD.—Mark Crosby, Boston, Mass.—This invention pertains to improvement in that class of bedsteads which are adapted to fold, when not in use, so as to resemble a bureau, sideboard, or other similar article of furniture, and the invention consists in the arrangement of stop pieces to hold, or assist in holding, the rails extended in the horizontal position, and in so constructing and arranging the side pieces or rails, with relation to each other and the base to which they are hinged that, when folded or brought together in a vertical position, openings will be formed for the admission and passage of air.

SASH LOCK.—E. D. Slater, Greenville, N. Y.—This invention relates to an improvement in locks for window sashes, and consists of two levers provided with bolts and a spring arranged within a case and operated by a single bar, so that both of the sashes may be kept locked, or either of them locked or unlocked without interfering with the other.

WASH BOILER.—H. T. Woodman, Dubuque, Iowa.—This invention relates to a new wash boiler which produces an automatic circulation of the suds by means of vertical pipes projecting from a perforated false bottom. This invention consists in forming said pipes by plates that are secured to the sides of the boiler so as to economize room, and in suspending the false bottom or bottoms from flanges that project inwardly from the said plates.

COMPOSITION FOR WELDING AND RESTORING CAST STEEL.—Thomas Fyans, Taunton, Mass.—This invention relates to a new composition by the use of which cast steel can be welded, and, should it have been overheated or burnt, restored to its former nature, and made capable of being forged for the finest tools.

SMOKE CONSUMING HEATER.—William Magill, Port Deposit, Md.—This invention has for its object the burning of fuel and all the smoke that arises therefrom, within the stove, in order that the greatest possible amount of heat may be generated, and turned to account in warming apartments, with the least possible waste, this end being accomplished by causing the smoke that rises through the magazine to meet a current of cold air and be thereby turned backwards and carried again through the fire-chamber, undergoing therein a second combustion.

CORNER FRICTION ROLLER.—Morris Schwerin, Newark, N. J.—This invention relates to a new and useful improvement in applying friction rollers to the bottoms of trunks, boxes, chests, and other articles.

FANNING MILL.—Nathan Kibler, Milton, Ill.—This invention relates to a new and useful improvement in mills for cleaning wheat and other grains and seeds, whereby that operation is more perfectly performed than it has hitherto been.

VAPOR BURNER.—Daniel Leonard, Chicago, Ill.—The object of this invention is to provide an attachment to vapor burners which will prevent their becoming excessively heated by the flame.

Official List of Patents.

Issued by the United States Patent Office

FOR THE WEEK ENDING Oct. 11, 1870.

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MUNN & CO.,
Patent Solicitors, No. 37 Park Row, New York.

108,082.—COVER OF CULINARY BOILER.—P. J. Abbott and Job Abbott, Dexter, Me.
108,083.—MEAT AND VEGETABLE MASHER.—G. A. Anderson and C. J. Baker, Albany, N. Y.
108,084.—CRUCIBLE FOR MELTING IRON AND STEEL.—J. E. Atwood, Pittsburgh, Pa. Antedated October 8, 1870.
108,085.—GEARING FOR WAGON.—J. B. Auger, Poughkeepsie, N. Y.
108,086.—BAKE OVEN.—A. A. Aull and J. A. Aull, Bellefontaine, Ohio.
108,087.—COMBINED PUMP AND SIPHON.—J. D. Averell and G. A. Higgins, New York city, and Thomas Gordon, Shrewsbury, N. J., assignors to G. A. Higgins. Antedated September 20, 1870.
108,088.—PROCESSES FOR THE MANUFACTURE OF CARBONATE OF SODA, HYDROCHLORIC ACID, ETC.—H. M. Baker, Washington, D. C.
108,089.—MANUFACTURE OF ALUMINATE OF SODA.—H. M. Baker, Brooklyn, E. D., N. Y.
108,090.—MANUFACTURE OF NITRIC ACID.—H. M. Baker, Williamsburg, N. Y.
108,091.—SHEARS FOR CUTTING FLOWERS.—J. W. Barbour (assignor to himself and Elisha Allen), Winooski Falls, Vt.
108,092.—BUFFING APPARATUS FOR FINISHING SPOONS.—Harry Barrett, Brooklyn, N. Y.
108,093.—POTATO DIGGER.—A. L. Bausman, Minneapolis, Minn.
108,094.—HORSE HAY FORK.—Stewart Bebout, Waterford, Ohio.
108,095.—PLOW.—B. C. Blomsten, Waupaca, Wis.
108,096.—DEVICE FOR OPENING AND CLOSING FANS.—George Bordes, New York city.
108,097.—MANUFACTURE OF BISCUIT.—C. D. Boss and C. D. Boss, Jr., New London, Conn.
108,098.—LOCK.—James Brady (assignor to the Branford Lock Works), Branford, Conn.
108,099.—LOCK.—James Brady (assignor to the Branford Lock Works), Branford, Conn.
108,100.—MACHINE FOR BRUSHING YARN.—John Brady, Fall River, Mass.
108,101.—CHOCK FOR HOLDING ROPES.—D. D. Brown, Oswego, N. Y.
108,102.—MANUFACTURE OF SEMOLINA AND FLOUR.—G. A. Buchholz, Regent's Park, London, England.
108,103.—MANUFACTURE OF SEMOLINA AND FLOUR.—G. A. Buchholz, Regent's Park, London, England.
108,104.—MOUSE TRAP.—Edward Buckman and Alexander Buckman, Brooklyn, N. Y. Antedated September 30, 1870.
108,105.—STOVE FASTENER.—J. C. Burdin, Ladoga, Ind.
108,106.—LAMP.—O. M. Chamberlain (assignor to himself and George Moore), New York city.
108,107.—RAILROAD TICKET.—C. A. Chamberlain, Pittsburgh, Pa.
108,108.—BRUSH.—R. J. Combs, Bergen, N. J.
108,109.—CANDLESTICK.—F. C. Cone, San Francisco, Cal. Antedated October 5, 1870.
108,110.—FOUNTAIN PEN.—F. C. Cone, San Francisco, Cal. Antedated October 8, 1870.
108,111.—SYRINGE.—George Conover, Mott Haven, N. Y.
108,112.—IRON FENCE.—Sommers Crowell, Philadelphia, Pa.
108,113.—MACHINE FOR SETTING UP BARRELS.—Amos Cutler, Boston, Mass.
108,114.—MACHINE FOR CUTTING LOCKS IN HOOPS.—Amos Cutter, Boston, Mass.
108,115.—MACHINE FOR MAKING BARREL HEADS.—Amos Cutter, Boston, Mass.
108,116.—MACHINE FOR BLOCKING AND STRETCHING HATS.—Joseph D. LaMar, Brooklyn, N. Y., assignor to himself and John De Vries, New York city. Antedated September 24, 1870.
108,117.—POTATO DIGGER.—William Dillon, Sonoma, Cal.
108,118.—FEED CUTTER.—C. R. Donner, Sonora, Cal.
108,119.—TOBACCO CUTTER.—J. G. Dreher, Pine Grove, Pa.
108,120.—GRAIN SEPARATOR.—Anthony Duus, San Francisco, Cal.
108,121.—MACHINE FOR FELTING.—Rudolf Eckemeyer, assignor to J. T. Waring, Yonkers, N. Y.
108,122.—ADJUSTABLE PILLOW.—Henry Eilers, Cincinnati, Ohio.
108,123.—APPARATUS FOR BENDING RAILROAD RAIL.—G. D Emerson, Calumet, Mich. Antedated September 26, 1870.
108,124.—CAR COUPLING.—L. A. Evans (assignor to himself and W. C. Boatwright), Chester, Pa.
108,125.—WASHING MACHINE.—Franklin Feazel, Lacon, Ill.
108,126.—HAND CORN SHELLER.—J. E. Finley, Memphis, Tenn.
108,127.—DEVICE FOR STARTING STREET CARS.—G. P. Frick, Baltimore, Md.
108,128.—SPRING MATTRESS.—Charles Fulton, New York city.
108,129.—COMPOSITION FOR WELDING AND RESTORING STEEL.—Thomas Fyans (assignor to himself and A. T. Thomson), Taunton, Mass.
180,130.—CAR ROOF.—John Garry, Cleveland, Ohio.
108,131.—SASH CORD FASTENER.—Christian Gies, New York city.
108,132.—SOLE SEWING MACHINE.—J. P. Greely, Boston, assignor to himself, J. B. Leonard, Chelsea, and Benjamin Greely, Dedham, Mass.
108,133.—NECK TIE.—L. A. Grill, New York city.
108,134.—PERMUTATION LOCK.—Henry Gross, Cincinnati, Ohio.
108,135.—CANE STRIPPER.—C. A. Hege, Friedberg, N. C.
108,136.—TRUNNION FOR STEAM ENGINE AND CALENDER.—Thomas Hill, Vallejo, Cal.
108,137.—VALVE GEAR FOR STEAM-ENGINES.—Thomas Hill, Vallejo, Cal.
108,138.—COMPOSITION FOR WELDING, PUDDLING, AND BRAZING METALS.—A. J. Bindemeyer (assignor to S. C. Collins), Philadelphia, Pa.
108,139.—APPARATUS FOR FINISHING TERRET.—Constantine Hingher, New Brunswick, N. J.
108,140.—SWAGING MACHING.—G. M. Hinkley, Milwaukee, Wis.
108,141.—BUTCHER'S KNIFE.—Peter Houseman and C. C Campbell, Rural Retreat, Va.
108,142.—RAILWAY RAIL JOINT.—G. A. Huddart, Brynkir, Wales.
108,143.—HINGE.—Abraham Huffer, Hagerstown, Md.
108,144.—WINDOW WASHER AND SCRUBBING PAD.—J. C. Hull, Meadville, Pa.
108,145.—COMPOSITION FOR PRINTING ROLLER.—I. G. Husted, Brooklyn, N. Y.
108,146.—WATER-CLOSET HOPPER.—Alfred Ivers, New York city.
108,147.—MACHINE FOR MANUFACTURING CHAIR SEAT.—E. S. Jackson, Bethel, Vt.
108,148.—ROTARY ENGINE.—Henry Jamieson, Williamsburgh, N. Y.
108,149.—PLOW.—John R. P. Jett, Knoxville, Tenn.
108,150.—EMBROIDERING ATTACHMENT FOR SEWING MACHINE.—A. W. Johnson, Middletown, Conn.
108,151.—UMBRELLA.—Frederick Johnson and Wm. Hatchman, London, England, assignors to T. C. Morton Paton, N. Y.
108,152.—COOKING STOVE.—John H. Jones, Memphis, Tenn.
108,153.—PERMUTATION-LOCK FAUCET.—W. F. Jones, Baltimore, Md., assignor to himself and C. A. Edmondston, Halifax, N. C.
108,154.—FEEDING DEVICE FOR FANNING MILL.—Nathan Kibler, Milton, Ill.
108,155.—SASH HOLDER.—George King, Frederick, Md.
108,156.—STEAM ENGINE.—Frank E. Kirby, New York city.
108,157.—MANUFACTURE OF POTTERY WARE.—Isaac W Knowles, East Liverpool, Ohio.
108,158.—APPARATUS FOR PRECIPITATING GOLD AND SILVER FROM SOLUTIONS.—W. S. Laighton, Norwich, Conn.
108,159.—COTTON CULTIVATOR.—P. R. Leatherman, Woodville, Miss.
108,160.—MAT.—Samuel Lewis, Williamsburgh, N. Y.
108,161.—LEATHER RENOVATOR.—W. G. Lumbard, Georgetown, Ill.
108,162.—GOVERNOR FOR STEAM ENGINE.—John D. Lynde, Philadelphia, Pa.
108,163.—HEATING STOVE.—William Magill, Port Deposit, Md.
108,164.—SUBSOIL PLOW.—L. V. B. Martin, Tuscaloosa, Ala.
108,165.—PILE FOR CORRUGATED BEAMS.—Richard Montgomery, New York city.
108,166.—TRUNK LOCK.—Joseph Morgan, New York city Antedated September 24, 1870.
108,167.—TRAY FOR GAS PURIFIER.—Peter Munzinger, Philadelphia, Pa.
108,168.—WASHING MACHINE.—G. R. Nebinger, Philadelphia, Pa.
108,169.—APPARATUS FOR EVAPORATING SORGHUM JUICE, COOKING FEED, ETC.—Thomas J. Newby, Richmond, Ind. Antedated October 1, 1870.
108,170.—COLORTROPE.—Oscar Nicholson, New York city.
108,171.—SASH FASTENER.—John G. Nicolay, Springfield, Ill.
108,172.—UNIVERSAL JOINTED TREADLE.—Alfred Nielson, New York city.
108,173.—TRANSMITTING-POWER APPARATUS.—Richard W Norwood, Courtland, Ala. Antedated October 1, 1870.
108,174.—STEAM GENERATOR.—Samuel B. B. Nowlan, New York city.
108,175.—MACHINE FOR FORMING HAT BODIES.—Isaiah Nutt (assignor to himself, John Wharton, and Abraham C. Wheaton), Newark, N. J.
108,176.—COMBINED PLOW AND SCRAPER FOR ROADS.—T. B. Parker, Linesville, Pa.
108,177.—MANUFACTURE OF PAPER.—Henry Pemberton, Allegheny City, Pa.
108,178.—HORSE POWER.—Lewis A. Peter, Neffs, Pa.
108,179.—THREE-HORSE EQUALIZER.—J. C. Pfeil, Arenzville Ill.
108,180.—FIREPLACE.—Thomas Phillips, Cadiz, Ohio.
108,181.—WOOD PAVEMENT.—A. Warner Platt, New York city.
108,182.—WINDOW BLIND.—Stephen Pocock, Woodstock Canada.
108,183.—COMBINED ELEVATOR AND CONVEYOR.—Thomas J Powell, Naples, N. Y.
108,184.—PARLOR SKATE.—John Pollitt (assignor to himself and Lyman Martin), Indianapolis, Ind.
108,185.—AUTOMATIC VENTILATOR.—B. F. Prentis, Benwood West Va.
108,186.—GATE.—Simon Regan and Edward Meusy, Lamotte, Iowa.
108,187.—EXTENSION TRUNK.—James Rice, Middletown, Ind
108,188.—PISTON-ROD PACKING.—E. A. Richmond (assignor to himself and Charles Watson), San Francisco, Cal.
108,189.—MACHINE FOR DRESSING PELLIES.—Wm. H. Rodeheaver, Miamisburg, Ohio.
108,190.—CURTAIN FIXTURE.—Franklin Root, Hartford, Conn. Antedated September 20, 1870.
108,191.—REMOVING GREASE FROM WASTE LEATHER.—J. P Rust Peabody, Mass.
108,192.—APPARATUS FOR WATER-PROOFING FABRICS WITH GUTTA-PERCHA.—E. A. Schuette, New York city.
108,193.—CASTER FOR TRUNK.—Morris Schwerin, Newark, N. J.
108,194.—SASH FASTENER.—Philip T. Share, Baltimore, Md.
108,195.—FLOWER TRELLIS.—Philo B. Sheldon, Bath, N. Y Antedated September 26, 1870.
108,196.—FERTILIZER DISTRIBUTER.—Joseph J. Singleton, Forsyth, Ga.

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108,197.—COMBINED CORN HARVESTER AND HUSKER.—Augustus Smith, Pontiac, Ill.
108,198.—PURIFYING BRINE FOR THE MANUFACTURE OF SALT.—F. M. Smith, Syracuse, N. Y.
108,199.—WASH FOR THE CURE OF SCAB IN SHEEP, ETC.—Hugh Smith, San Francisco, Cal.
108,200.—CARPET FASTENER.—John H. Stanton, Franklin, Ohio.
108,201.—SAWMILL.—Fred. T. Stevens, Columbia, N. H.
108,202.—APPARATUS FOR HEATING AND VENTILATING BUILDINGS.—Joel Stover, Richmond, Ind.
108,203.—EGG BEATER.—Daniel M. Swartz, Lewisburg, Pa.
108,204.—SASH HOLDER.—Hiram B. Swartz, Milton, Ohio.
108,205.—ADJUSTABLE TWEER.—Peter Sweeney, New York city.
108,206.—SLEIGH LOCK.—Freeman Talbot, Cleveland, Minn.
108,207.—SHUCK-HACKLING MACHINE.—W. H. Tappey, Wm. C. Lumsden, and Alexander Steele, Petersburg, Va.
108,208.—PRESS.—W. I. Tate (assignor to himself and H. R. Mitchell), Philadelphia, Pa.
108,209.—WATER WHEEL.—Albert P. Teachout, Madison, Ohio.
108,210.—SASH FASTENER.—W. H. Thomas, Brooklyn, N. Y., assignor to Turner, Seymour & Judds, Wolcotville, Conn.
108,211.—COOKING STOVE.—Edgar L. Thomson and Abraham Hursh (assignors to Hattie B. Thomson and Abraham Hursh), Philadelphia, Pa.
108,212.—HEATING STOVE.—Alvah Traver, Troy, N. Y.
108,213.—SEED PLANTER AND GUANO DISTRIBUTER.—W. L. Trayuham, Warrenton, Ga.
108,214.—GANG PLOW.—James Wilson Treadway, Crown Point Center, N. Y., assignor to Oliver A. Whittemore, Denver, Colorado.
108,215.—STEAM TRAP.—S. D. Tripp, Lynn, Mass. Antedated Sept. 26, 1870.
108,216.—LEATHER-BUFFING MACHINE.—S. D. Tripp, Lynn, Mass. Antedated Oct. 1, 1870.
108,217.—DITCHING MACHINE.—Henry Vannatta, Jefferson, Ill.
108,218.—HANDLES FOR CANES AND UMBRELLAS.—Albert Wanner, Hoboken, N. J. Antedated Oct. 1, 1870.
108,219.—COOKING STOVE.—Leroy D. Webber, La Porte, Ind.
108,220.—COOKING STOVE.—Alexander Wemyss, Philadelphia, Pa.
108,221.—LANTERN.—Wm. Westlake, Chicago, Ill.
108,222.—LANTERN.—Wm. Westlake, Chicago, Ill.
108,223.—NUT LOCK.—Shepherd H. Wheeler, Dowagiac, Mich.
108,224.—TOY LOCOMOTIVE.—James E. Wickham, Hartford, Conn.
108,225.—MACHINE FOR MAKING NAILS.—A. P. Winslow, Cleveland, Ohio.
108,226.—WASH BOILER.—Harvey T. Woodman, Dubuque, Iowa.
108,227.—FENCE.—Nathan Woolsey, Ottawa, Ill.
108,228.—STONE-CUTTING MACHINE.—Hugh Young, Middletown, Conn., and James L. Young, New York city. Antedated Oct. 1, 1870.
108,229.—LEATHER-CUTTING MACHINE.—A. L. Zent, Roanoke, Ind.
108,230.—PROPELLING VESSELS.—Jean Lucien Arman, Bordeaux, France.
108,231.—ANVIL LAST.—David Bainbridge, Philadelphia, Pa.
108,232.—CHURN DASHER.—Silas E. Bauder, Birmingham, Ohio.
108,233.—APPARATUS FOR SPINNING HEMP, FLAX, AND OTHER FIBROUS SUBSTANCES.—Ernest Bazin, Paris, France.
108,234.—CURLING IRON.—J. O. Bentley and Jas. Jackson, Philadelphia, Pa.
108,235.—EXTRACTING IRON FROM THE SLAG OF BLAST FURNACE.—E. J. Bird, Frostburg, Md.
108,236.—SPRING FAN.—Otto Brueck, New York city.
108,237.—PUMP VALVE.—D. W. Clark, Tidioute, Pa.
108,238.—ROAD SCRAPER AND DITCHER.—George Clark, Dover, assgnor to himself, Franklin B. Ives, Tiskilwa, and R. L. Dean, Dover, Ill.
108,239.—CORN PLOW.—W. C. Clifton, Elk River township, Iowa.
108,240.—COOK STOVE.—W. C. Davis, Cincinnati, Ohio.
108,241.—DISINTEGRATING FIBROUS MATERIAL FOR PAPER PULP, ETC.—A. H. F. Deininger, Berlin, Prussia.
108,242.—WATER ELEVATOR.—Isaiah Dekle, Thomasville, Ga.
108,243.—PLOW.—Isaac Eastwood, Lanark, Ill.
108,244.—BEEHIVE.—Chas. Embrey, Williamsport, Md.
108,245.—CASTING DENTAL PLATE.—J. U. L. Feemster (assignor to G. W. Scott), Greencastle, Ind.
108,246.—FLOUR BOLT.—Jacob Fickinger, Kingsville, Ohio.
108,247.—PLOW.—Asahel Franklin and F. M. Franklin, Springfield, Ohio. Antedated Oct. 1, 1870.
108,248.—DITCHING MACHINE.—Sam'l F. Gard, New Orleans, La.
108,249.—FEED CUTTER.—F. E. Garner, Cornwall, Conn.
108,250.—SAW MILL.—David G. Gay, Eugene City, Oregon.
108,251.—MAIL-BAG FASTENER.—David G. Gay, Eugene City, Oregon.
108,252.—TRUSS.—Jacob Geiss, Belleville, Ill.
108,253.—TRUSS.—John Goodier, Philadelphia, Pa.
108,254.—CAR COUPLING.—W. F. Grasler, Muncy, Pa.
108,255.—ROCKING CHAIR.—Charles Grawitz, Buffalo, N. Y.
108,256.—SHUTTER FASTENER.—Henry Grow, Philadelphia, assignor to himself and W. G. Smith, Norristown, Pa.
108,257.—ELECTRO-MAGNETIC BURGLAR ALARM.—Wm. B. Guernsey, Jersey City, N. J.
108,258.—BAKE OVEN.—Jas. Hall, Cincinnati, Ohio.
108,259.—BELT GEARING.—George B. Hamlin, Willimantic, Conn.
108,260.—CULTIVATOR.—V. P. Harris, Creensburg, Ind.
108,261.—REVERSIBLE KNOB LATCH.—A. M. Hill, New Haven, Conn.
108,262.—GUANO DISTRIBUTER AND SEEDSOWER.—B. F. Hinkley, Baltimore, Md.
108,263.—DRY GAS METER.—Perry Hodge, Seneca Falls, N. Y.
108,264.—PUMP.—D. O. Holman (assignor of one half his right to J. P. Sanders), Adams, N. Y.
108,265.—PUMP.—D. O. Holman, Adams, N. Y.
108,266.—WASHING MACHINE.—Benjamin Illingworth, Freeport, Ill.
108,267.—AUGER HANDLE.—William A. Ives, New Haven, Conn.
108,268.—DOOR SPRING.—William F. Kells, San Francisco, Cal.
108,269.—MACHINE FOR CLEANING AND DITCHING RICE FIELDS.—S. M. King, Lancaster, Pa.
108,270.—HOLDER FOR SPINNING RING.—G. W. Knight (assignor to Geo. Draper & Son), Hopedale, Mass.
108,271.—MANUFACTURE OF BLACKING.—J. L. Lucas, Saratoga Springs, N. Y.
108,272.—SHOVEL PLOW.—Luppe Luppen, Pekin, Ill.
108,273.—SHOVEL PLOW.—Luppe Luppen, Pekin, Ill.
108,274.—SHOVEL PLOW.—Luppe Luppen, Pekin, Ill.
108,275.—SHOVEL PLOW.—Luppe Luppen, Pekin, Ill.
108,276.—SHOVEL PLOW.—Luppe Luppen, Pekin, Ill.
108,277.—RAILWAY CAR AXLE BOX.—G. F. Lynch, Milwaukee, Wis.
108,278.—WORK BOX.—J. E. Marvel, Seaford, Del.
108,279.—HARROW.—John Mellinger, Greensburg, Pa.
108,280.—TRICE BOX.—Harry Merrick, Brooklyn, N. Y.
108,281.—LOOM.—John Miller, Eldridge, Ill.
108,282.—KING BOLT.—F. B. Morse, Plantsville, Conn.
108,283.—DIE FOR SWAGING CARRIAGE CLIP.—F. B. Morse (assignor to D. H. Smith & Co.), Plantsville, Conn.
108,284.—IMPREGNATING FIBROUS MATERIALS FOR PACKING, ETC.—Eliza D. Murfey, New York city.
108,285.—SATURATING FIBROUS MATERIAL WITH POWDERED SUBSTANCES FOR BEARINGS AND PACKING.—Eliza D. Murfey, New York city.
108,286.—MATERIAL FOR PACKING AND BEARINGS.—Eliza D. Murfey, New York city.
108,287.—MANUFACTURE OF STEEL.—Charles M. Nes, York, Pa.
108,288.—APPARATUS FOR COOKING AND EVAPORATING.—T. J. Newby, Richmond, Ind.
108,289.—FRUIT DRYER.—J. B. Okey, Indianapolis, Ind., assignor of one half his right to F. A. Lehr.
108,290.—MOLD FOR SHAPING AND DRYING CIGAR BUNCHES.—Adolph Pearl, New York city.
108,291.—MANUFACTURE OF VINEGAR.—Paul Plodeck, Cleveland, Ohio.
108,292.—LOOM.—W. J. Porter, New York city, and William Cross, Jersey City, N. J., assignors to Edward H. Faulkner, New York city.
108,293.—BOX OPENER.—Nathan Purdey, Providence, R. I.
108,294.—GRAIN DRILL.—John L. Riter, Brownsville, Ind.
108,295.—FEEDING MECHANISM FOR WOOD SCREW MACHINERY.—C. D. Rogers, Utica, N. Y.
108,296.—MITER MACHINE.—L. W. Rosecrans, Marshalltown, Iowa.
108,297.—CHURN.—Henry Saggan, Newark, N. J.
108,298.—COAL-VAULT GRATE.—G. W. Scott, Greencastle, Ind.
108,299.—TRUNK CLAMP.—A. J. Sessions, deceased (by Ellen L. Sessions, administratrix, assignor to John H. Sessions), Bristol, Conn.
108,300.—CASTERS FOR TRUNK.—A. J. Sessions, deceased (by Ellen L. Sessions, administratrix, assignor to J. H. Sessions), Bristol, Conn.
108,301.—WELL TUBE.—A. J. Shirley, Plymouth, Ind.
108,302.—APPARATUS FOR GENERATING GAS FOR HEATING.—Levi Stevens, Washington, D. C.
108,303.—CRUTCH.—John Wentworth Tuttle, Newton, Mass.
108,304.—MOP HEAD.—W. P. Valentine (assignor to himself and J. R. Drake, Buffalo), N. Y.
108,305.—PLANING MECHANISM.—C. Van Haagen (assignor to himself and A. Van Haagen), Philadelphia, Pa.
108,306.—TURNING AND BORING MECHANISM.—Claus Van Haagen (assignor to himself and Anthony Van Haagen), Philadelphia Pa.
108,307.—MACHINE FOR SAWING STONE.—Luther Ward, Trenton, N. J.
108,308.—HEAD-REST.—Mahlon Warne, Philadelphia, Pa.
108,309.—NECKTIE.—H. P. Wetmore, Elizabeth, N. J., and John G. Hitchcock, New York city.
108,310.—BORING APPARATUS.—Jerome Wheelock, Worcester, Mass.

REISSUES.

4,149.—HOT-BLAST STOVE FOR BLAST FURNACE, ETC.—Jas. Henderson, New York city, and J. M. Lawford, Philadelphia, Pa., assignees of John Player, deceased.—Patent No. 65,599, dated June 11, 1867; patented in England, April 21, 1866.
4,150.—APPARATUS FOR HEATING THE BLAST FOR FURNACES USED IN SMELTING IRON, ETC.—James Henderson, New York city, and J. M. Lawford, Philadelphia, Pa., assignees of John Player, deceased.—Patent No. 65,600, dated June 11, 1870; patented in England, March 25, 1865.
4,151.—BRUSH.—James McQuide, Lansingburg, N. Y., assignee of John Marchbank.—Patent No. 59,850, dated November 20, 1866.
4,152.—PRINTING TELEGRAPH.—Geo. M. Phelps, Brooklyn, N. Y.—Patent No. 89,887, dated May 11, 1869.
4,153.—MANUFACTURE OF CAST STEEL.—L. La Breche-Viger, Montreal, Canada, assignor to W. W. Averell, Bath, N. Y.—Patent No. 95,358, dated September 28, 1869; reissue No. 3,835, dated February 15, 1870.
4,154.—GUN CARRIAGE.—J. W. Wilson, New York city.—Patent No. 100,482, dated March 1, 1870.

DESIGNS.

4,389.—STOCKING.—Thompson Appleton, Lake Village, N. H.
4,390.—BLACK-BOARD ERASER.—J. H. Atwater, Providence, R. I.
4,391.—ADVERTISING DESK.—Albert Brummel, Indianapolis, Ind.
4,392 and 4,393.—TYPE.—Robert Bruce, Brooklyn, N. Y., assignor to David Wolfe Bruce, New York city. Two Patents.
4,394 to 4,397.—CARPET PATTERN.—Robert R. Campbell (assignor to Lowell Manufacturing Company), Lowell, Mass. Four Patents.
4,398.—CARPET PATTERN.—Jonathan Crabtree (assignor to John Gay), Philadelphia, Pa.
4,399.—OIL-CLOTH PATTERN.—Leonce F. Dandre, Paris, France.
4,400.—STOVE.—J. D. Flansburg, Philadelphia, assignor to Seymour Raymond and Joseph Campbell, Middletown, Pa.
4,401 and 4,402.—TYPE.—Julius Herriet (assignor to D. W. Bruce), New York city. Two Patents.
4,403.—OIL-CLOTH PATTERN.—James Hutchison, Newark, N. J., assignor to T. Potter, Son & Co., Philadelphia, Pa.
4,404 to 4,406.—OIL-CLOTH PATTERN.—Henry Kagy (assignor to T. Potter, Son & Co.), Philadelphia, Pa. Three Patents.
4,407.—HINGE.—A. C. Kasson, Milwaukee, Wis.
4,408.—INKSTAND.—David Merritt, Philadelphia, Pa.
4,409 and 4,410.—FLOOR OIL-CLOTH PATTERN.—C. T. Meyer, Newark, N. J., assignor to Edward C. Sampson, New York city. Two Patents.
4,411 to 4,414.—CARPET PATTERN.—Elemir J. Ney, Dracut, assignor to Lowell Manufactnring Company, Lowell, Mass. Four Patents.
4,415 and 4,416.—OIL-CLOTH PATTERN.—James Paterson, Elizabeth, N. J., assignor to Thomas Potter, Son & Co., Philadelphia, Pa. Two Patents.
4,417.—SHOW-CASE.—W. H. Reiff, Philadelphia, Pa.
4,418.—TEA AND COFFEE SERVICE.—E. G. Webster, Brooklyn, N. Y.

EXTENSIONS.

HYDRAULIC BRICK PRESS.—Ethan Rogers, of Cleveland, Ohio.—Letters Patent No. 15,778, dated September 23, 1856.
MODE OF CONSTRUCTING WALLS AND FLOORS OF CELLARS.—Sophia A. Moen, of Stamford, Conn., and Philip L. Moen, Worcester, Mass., administrators of the estate of A. R. Moen, deceased.—Letters Patent No. 14,323, dated February 26, 1856; reissue No. 367, dated April 8, 1856.
OVEN.—Hosea Ball, of New York city.—Letters Patent No. 15,753, dated September 23, 1856; reissue No. 3,666, dated October 12, 1869; reissue No. 4,026, dated June 14, 1870.
MACHINE FOR NOTCHING HOOPS.—Emily J. Lamson, of Weymouth, Mass., executrix of the estate of Daniel Lamson, deceased.—Letters Patent No. 15,768, dated Sept. 23, 1856.
ORE WASHER.—Samuel Thomas, of Hokendauqua, Pa.—Letters Patent No. 15,827, dated Sept. 30, 1856.
VISE.—C. C. Walworth, of Boston, Mass.—Letters Patent No. 15,862, dated October 7, 1856.
PLATE-HOLDER FOR PHOTOGRAPHIC CAMERAS.—William Lewis, of Brooklyn, N. Y., and Wm. H. Lewis, of New York city.—Letters Patent No. 15,854, dated October 7, 1856.

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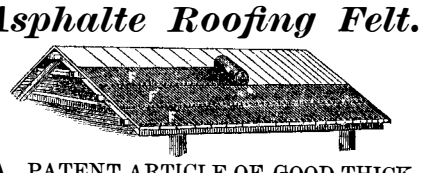
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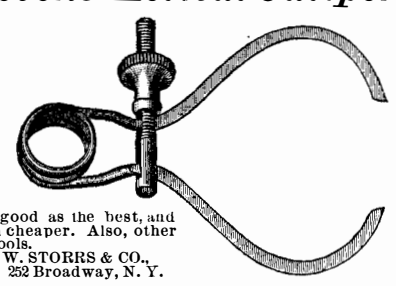

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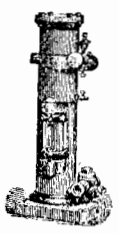

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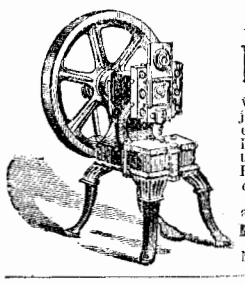

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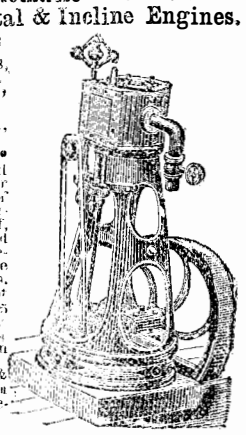

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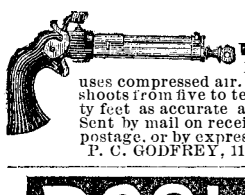

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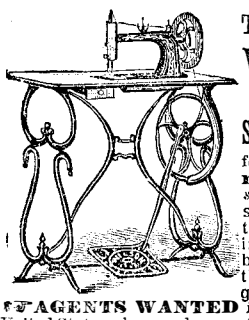

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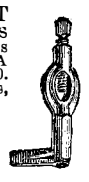

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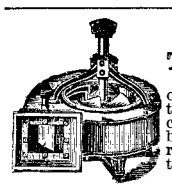

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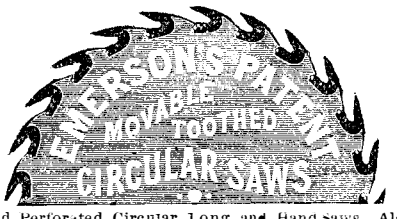

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